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# FIVE NEW SPECIES OF CHINESE PLANTS

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The following diagnoses and descriptions of five species of Chinese plants, apparently hitherto undescribed, are based on material collected by Prof. K. K. Ts'oong, of Peking University; Mr. H. H. Chung, of Amoy University; and Mr. A. N. Steward, of Nanking University. The types are preserved in the herbarium of the University of California.

## URTICACEÆ

### Genus ELATOSTEMA Forster

**Elatostema stewardii** sp. nov.

Herba erecta, simplex, 25 ad 30 cm alta, subglabra; foliis valde inaequalibus, inferioribus obovatis, rotundatis, 1.2 ad 3 cm longis, superioribus gradatim longioribus, inaequilateralibus, plus minusve falcatis, tenuiter subcaudato-acuminatis, grosse serrato-dentatis, oblongis ad oblongo-ellipticis, usque ad 6 cm longis, membranaceis, supra cystolithis numerosis instructis, utrinque, praesertim junioribus, parce et breviter ciliato-setosis; receptaculis ♀ sessilibus, circiter 3 mm diametro, bracteis bracteolisque obscure ciliatis, bracteis exterioribus plus minusve connatis, 1 ad 1.2 mm longis, planis vel obscure cucullatis, haud corniculatis, bracteolis membranaceis, brevioribus, ellipticis, rotundatis; acheniis 0.8 mm longis.

An erect, simple, rather slender herbaceous plant, 25 to 30 cm high, the stems glabrous, about 2 mm in diameter below, slenderer above, and sparingly ciliate near the apex. Leaves membranaceous, green when dry, of the same color on both surfaces, especially when young, sparingly ciliate-setose with short, scattered, white hairs, the upper surface with numerous small cystoliths, the margins coarsely serrate-dentate, or those of the lower leaves crenate, 8 to 13 teeth on the broader side, somewhat fewer on the narrower side, the lower leaves obovate, broadly rounded, 1 to 3 cm long, the upper gradually longer, the uppermost oblong to oblong-elliptic, slenderly subcaudate-acuminate, the acumen about 1 cm long, distinctly inequilateral, more or less falcate, the base rounded on one side, acute on the other, the broader side with three sharply ascending nerves, the inner one extended and arched-anastomosing with few (usually 4), lateral nerves, the well-developed marginal teeth up to 5 mm long along the longer side. Petioles none. Stipules lanceolate, 3 to 5 mm long. Pistillate flowers axillary, sessile, the inflorescences many-flowered, subglobose, 3 mm in diameter, the bracts and bracteoles thin, slightly ciliate, the outer bracts more or less united, 1 to 1.2 mm long, plane or somewhat cucullate, not spurred, the bracteoles elliptic, rounded, shorter than the bracts. Achenes 0.8 mm long. Staminate flowers unknown.

Kiangsi Province, Lu Shan, near Kuling, *A. N. Steward 2628*, July 31, 1922, on shaded damp banks near springs at the Emerald Pool, altitude about 700 meters.

A species belonging in the general group with *Elatostema sessile* Forst. but remote from the typical form of Forster's species. It is well characterized by its variable leaves, the lower ones being broadly obovate, crenate, rounded, gradually becoming longer upward and changing in shape, the upper ones being elongated, falcate, caudate-acuminate, serrate-dentate, conspicuously inequilateral, and in general oblong to elliptic-oblong.

## LEGUMINOSÆ

### Genus CAESALPINIA Linnæus

**Caesalpinia tsoongii sp. nov.**

Frutex scandens, aculeatus, subglaber (floribus ignotis), ramulis teretibus, plus minusve ferrugineo-pubescentibus; foliis saltem 30 cm longis, bipinnatis, foliolis paucis, oblongo-ovatis,

coriaceis, acuminatis, basi rotundatis, plerumque leviter inaequilateralibus, usque ad 9 cm longis, supra glabris, subtus pallidioribus, glabris, vel junioribus obscurissime pubescentibus; fructibus inermis, compressis, inaequilateraliter orbiculari-ovatis, circiter 4 cm longis, apice inaequilateraliter abrupteque apiculato-rostratis, in siccitate castaneis, nitidis, distincte reticulatis. Seminibus solitariis, 2 cm diametro.

A scandent shrub, armed with short, scattered, stout, recurved spines on the branchlets and on the primary and secondary axes of the bipinnate leaves, the spines 1.5 to 3 mm long, the younger parts more or less ferruginous-pubescent, in age becoming glabrous or nearly so, the ultimate branchlets 3 to 4 mm in diameter, terete. Leaves bipinnate, at least 30 cm long, the pinnæ 2 or 3 pairs, their axes 8 to 9 cm long. Leaflets about 3 pairs, oblong-ovate, coriaceous, acuminate, base rounded, usually more or less inequilateral, 6 to 9 cm long, 2.5 to 3.5 cm wide, the upper surface glabrous, pale olivaceous, somewhat shining, the lower surface somewhat paler, sparingly pubescent along the midrib, becoming glabrous; lateral primary nerves about 20 on each side of the midrib, slender, rather distinct, anastomosing, the reticulations evident on both surfaces; petiolules about 1 mm long. Infructescence apparently terminal, paniculate, sparingly pubescent, the rachis terete, about as thick as the branchlets. Fruits smooth, unarmed, compressed, inequilaterally orbicular-ovate, about 4 cm long, 3.5 cm wide, the upper suture slightly curved, with a thickened, narrow (1.5 mm) wing or keel, the lower suture semicircular, not keeled or thickened, the inequilateral apex with a prominent beak about 5 mm long, the valves coriaceous, castaneous, shining, distinctly reticulate. Seed solitary, castaneous, compressed, nearly circular in outline, 2 cm in diameter.

Szechuen Province, without definite locality, *K. K. Ts'oong 4190.*

A remarkably distinct species, characterized by its relatively large leaflets and its glabrous, compressed, unarmed, reticulate, orbicular-ovate, 1-seeded fruits. Although probably most closely allied to *Caesalpinia nuga* Ait., it is remote from that species, differing totally in its vegetative and fruit characters. It is not at all related to *Caesalpinia szechuensis* Craib, the only other species of the genus definitely recorded from Szechuen Province other than the well-known and widely distributed *C. sepiaria* Roxb.

## SABIACEÆ

### Genus MELIOSMA Blume

**Meliosma stewardii sp. nov. § *Simplices.***

Arbor parva, circiter 5 m alta, ramis glabris, ramulis parce adpresse ferrugineo-setosis vel ciliatis; foliis chartaceis vel submembranaceis, oblongo-ellipticis, 10 ad 14 cm longis, plerumque utrinque subaequaliter angustatis, basi acutis, apice tenuiter acute acuminatis, dentatis, dentibus incurvato-mucronatis, distinctis, margine deorsum integris, supra glabris, brunneo-olivaceis, subtus pallidioribus, ad costa nervisque distincte albido-ciliatis vel pilosis, axillis subbarbatis, nervis utrinque circiter 20, perspicuis; petiolo 1 ad 1.5 cm longo; paniculis terminalibus, pyramidatis, circiter 10 cm longis, ferrugineo-pubescentibus, ramis patulis, inferioribus ad 6 cm longis; floribus breviter pedicellatis, sepalis elliptico-ovatis, obtusis, obscure pubescentibus vel subglabris, 0.6 mm longis; ovario glabro, stylo 0.7 mm longo.

A small tree, about 5 m high, the branches glabrous, dark gray, terete, about 2 mm in diameter, the branchlets sparingly ferruginous setose or ciliate, the indumentum appressed. Leaves chartaceous or submembranaceous, scattered, simple, oblong-elliptic, 10 to 14 cm long, 3.5 to 5 cm wide, subequally narrowed to the acute base and to the conspicuously acute-acuminate apex, the upper surface brownish olivaceous, smooth, glabrous, the lower surface somewhat paler, the midrib and nerves distinctly white-ciliate or pilose, the indumentum somewhat denser in the axils, the surface glabrous, the margins with conspicuous teeth terminating each nerve, their tips incurved-mucronate; lateral nerves about 20 on each side of the midrib, prominent, straight, the primary reticulations lax, subparallel, distinct; petioles 1 to 1.5 cm long. Panicles terminal, erect, pyramidal, shortly peduncled, about 10 cm long, the primary branches few, spreading, the lower ones up to 6 cm long, the indumentum of short, somewhat spreading hairs. Flowers rather scattered, shortly pedicelled, the bracts lanceolate, acuminate, pubescent, about 1 mm long, the bracteoles similar but smaller. Sepals elliptic-ovate to broadly ovate, rounded, slightly pubescent or nearly glabrous, 0.6 mm long. Ovary ovoid, glabrous; style 0.7 mm long.

Kiangsi Province, Kuling, *A. N. Steward 2443*, July 7, 1922. In thickets on slopes, altitude about 1,300 meters.

A species belonging in the general group with *Meliosma dilleniaefolia* Hook. f.; among the Chinese species manifestly allied to *Meliosma cuneifolia* Franch. and *M. myrianthum* S. and Z., from both of which it differs in its vegetative characters and in its shorter panicles.

## LYTHRACEÆ

### Genus LAGERSTROEMIA Linnæus

**Lagerstroemia limii** sp. nov. § *Velaga.*

Species *L. subcostatae* Koehne affinis, differt calycis tubo extus hirsuto, inter lobis perspicue appendiculatis, appendicibus reniformibus, circiter 3 mm latis.

A shrub or small tree, the branches terete, brownish, glabrous, the bark more or less stringy, the branchlets terete, usually densely pubescent. Leaves elliptic to oblong-elliptic, coriaceous to subcoriaceous, 6 to 9 cm long, 2.5 to 4 cm wide, base acute to somewhat rounded, apex shortly and rather sharply acuminate, olivaceous, very obscurely pubescent, becoming glabrous, the lower surface rather densely pubescent on the midrib, nerves and reticulations with short soft hairs; lateral nerves about 10 on each side of the midrib, prominent; petioles pubescent, about 2 mm long. Panicles up to 15 cm long, the rachis densely pubescent, the primary branches few, pubescent. Flowers pink to purplish. Calyx tube cup-shaped, about 5 mm in diameter, distinctly 12-ribbed, hirsute outside, especially on the ribs, the lobes usually 6, oblong-lanceolate, somewhat acuminate, 3 to 3.5 mm long, with alternating thickened, reniform appendages about 3 mm wide attached to the outside of the tube. Filaments of the episepalous stamens about 10 mm long, the smaller stamens about 35, their filaments 7 mm long. Ovary ellipsoid, glabrous; style 13 mm long. Petals slenderly clawed, the claw about 6 mm long, the limb crisped, orbicular-ovate, rounded, base truncate-rounded to deeply cordate, 7 to 8 mm in diameter.

Fukien Province, Amoy, *H. H. Chung 1644* (type), *1682*, May and June, 1923. Somewhat less pubescent forms are represented by *Chung 801* and *1770*.

This species is manifestly related to *Lagerstroemia subcostata* Koehne, but differs remarkably through the appendaged calyx tube, the conspicuous, reniform, spreading or reflexed, thickened appendages alternating with the calyx lobes. The calyx tube is also conspicuously hirsute, not glabrous. It is dedicated to Dr. Lim Boom Keng, president of Amoy University, in appreciation

of his interest in the prosecution of botanical work in Fukien Province.

## MYRSINACEÆ

### Genus EMBELIA Burman

**Embelia hainanensis** sp. nov. § *Pattara.*

Frutex ut videtur scandens, racemis glanduloso-pubescentibus exceptis glaber, ramis ramulisque teretibus, lenticellatis, tenuibus; foliis chartaceis, oblongis ad oblongo-ellipticis, integris, 5 ad 8 cm longis, petiolatis, utrinque subaequaliter angustatis, basi acutis, apice obtusis, admodum obscure retusis, nervis primariis utrinque 5 ad 7, distantibus, distinctis, arcuato-anastomosantibus; inflorescentiis stricte racemosis, 3 ad 5 cm longis, axillaribus, solitariis, multifloris; floribus 5-meris, calycis glandulosis, leviter pubescentibus, lobis acutis, 0.5 mm longis; petalis glandulosis, symmetricis, oblongo-ellipticis, obtusis, 1.8 mm longis, filamentis quam petalis paullo longioribus, obscure pubescentibus, antheris late ovatis, obtusis vel rotundatis.

A shrub, apparently scandent, entirely glabrous except the glandular-pubescent racemes. Branches and branchlets slender, terete, lenticellate, brownish. Leaves chartaceous, oblong to oblong-elliptic, entire, 5 to 8 cm long, 2.5 to 3.5 cm wide, somewhat olivaceous, subequally narrowed to the acute base and to the obtuse or slightly retuse apex; primary lateral nerves 5 to 7 on each side of the midrib, slender, distinct, irregular, arched-anastomosing, the reticulations distinct; petioles 8 to 10 mm long. Racemes axillary, solitary, distinctly pubescent with short, somewhat glandular hairs, 3 to 5 cm long, many-flowered, the pedicels 2.5 mm long, the linear-lanceolate, glandular-punctate, and pubescent bracteoles about 1 mm long. Calyx 1.5 mm in diameter, pubescent, somewhat glandular-punctate, the lobes 5, triangular-ovate, acute, 0.5 mm long. Petals symmetric, oblong-elliptic, 1.8 mm long, obtuse, glandular-punctate especially in the upper half. Filaments slightly pubescent, about 2 mm long; anthers broadly ovoid, 0.4 mm long, rounded or obtuse, the connectives obscurely glandular-punctate. Ovary glabrous.

Hainan, without definite locality, *K. K. Ts'oong 2713.*

A well-marked species belonging in the group with *Embelia tsjeriam-cottam* A. DC., differing in its entirely glabrous branchlets, somewhat smaller, obtuse or somewhat retuse, fewer-nerved, glabrous leaves, in its rounded or obtuse, not acute anthers, obtuse petals, and numerous other details.

# A SUPPLEMENT TO POISONOUS AND WORTHLESS FISHES [1]

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Just as the page proof of my paper on Philippine plectognath fishes was completed, I obtained a fine specimen of the species described herein, which adds to the Philippine fauna a family hitherto unknown from Philippine waters. All the families of gymnodont fishes are now recorded from the Philippines.

*Key to the families of Gymnodontes.*

$a^1$. Caudal fin normally developed, with a distinct caudal peduncle.
  $b^1$. Pelvis very long, ribs well developed; upper jaw divided by a median suture, lower jaw undivided..... Triodontidæ.
  $b^2$. Pelvis and ribs obsolete.
    $c^1$. Upper and lower jaws each divided into right and left halves.
      $d^1$. Back broadly rounded; head broad; nostrils various; frontal bones united with supraoccipital..... Tetraodontidæ.
      $d^2$. Back more or less sharply ridged; nostrils obsolete or very small; frontal bones separated from supraoccipital by the post-frontals which meet in the middle..... Canthigasteridæ.
    $c^2$. Upper and lower jaws each entire; the premaxillary and dentary bones grown together, forming jointless arches; maxillaries extended laterally behind; body covered with stout rooted spines. Diodontidæ.
$a^2$. Body cut off behind dorsal and anal without a caudal peduncle and with caudal region aborted; jaws not divided..... Molidæ.

## TRIODONTIDÆ

This unique family, belonging to the suborder Gymnodontes, is composed of but a single genus with only one known species, and is easily separated from all related groups by the peculiar teeth and body covering and the saclike abdomen. The teeth of the upper jaw are divided by a median suture into equal right and left halves, but those of the lower jaw form a single undivided plate. The whole body is covered with small, bony, spiny, scalelike plates which are more or less overlapping. The abdomen can be dilated into an enormous, laterally compressed, pendant bag which is kept expanded by the very long pelvic bone; the lower part of the sac is only a flap of skin into which the air does not penetrate. The skeleton is bony, with well-

[1] Philip. Journ. Sci. 25 (1924) 415.

developed ribs. The head is deep and narrow, very strongly compressed laterally; the body is likewise compressed, with short dorsal and anal fins placed far back; the tail is long, at first subcylindrical but soon strongly compressed dorsoventrally, and ends in a medium-sized forked fin; there are two nostrils on each side, situated close together and very high up and far back on the snout.

This family is intermediate between ordinary fishes and the other families of gymnodonts.

## Genus **TRIODON** Reinwardt

*Triodon* Reinwardt, CUVIER, Régne Anim. 2d ed. (1829) about 390; "Disciples' edition" (1836) 340.

The characters of the genus are included in the family description given.

### **Triodon bursarius** Reinwardt.

*Triodon bursarius* Reinwardt, CUVIER, Régne Anim. 2d ed. (1829) about 390; "Disciples' edition" (1836) 340, pl. 112, figs. 1, 1a; BLEEKER, Atlas Ichth. 5 (1867) 84, pl. 214, fig. 1; GÜNTHER, Cat. Fishes Brit. Mus. 8 (1870) 270; DAY, Fishes of India (1878) 698; JORDAN and SNYDER, Proc. U. S. Nat. Mus. 24 (1901) 230.

*Triodon macropterus* LESSON, Voy. Coquille (1830) 103; Atlas Poissons (1826) pl. 4.

Dorsal rays 10; anal rays 9. Head very large, narrow, and deep, and contained a trifle more than 3 times in length; top of head very broad and bony, widest behind the concave interorbital space and with jutting orbital ridges; profile convex with boldly projecting upper teeth which are not covered by upper lip; eye large, a trifle smaller than length of mouth, and contained 4.4 times in head and 2.4 times in snout which is contained $1\frac{5}{8}$ times in head; depth proper of body 3.9 in length, and depth including the sac 2.6 times in length; caudal fin a little more than half as long as head.

Color in alcohol yellowish brown, with a pinkish shade on belly flap; on upper part of sac and below and behind pectorals on each side a large elongate black spot of irregular shape with a yellowish margin.

This singular fish is here described from a specimen of typical appearance, 336 millimeters long or 394 millimeters over all, obtained at Dumaguete, Oriental Negros. This interesting species, which has not previously been recorded from the Philippines, occurs from Mauritius to Amboina and northward to southern Japan, but is apparently not common anywhere.

# BEES FROM SAMAR, PHILIPPINE ISLANDS

By T. D. A. COCKERELL and NORMA LEVEQUE
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The described species of bees of the Philippine Islands, up to the present time, have been recorded from the following islands. The numbers would be somewhat increased if varieties were included in the statistics.

| | |
|---|---|
| Luzon | 101 |
| Mindoro | 1 |
| Batbatan | 6 |
| Panay | 30 |
| Leyte | 9 |
| Negros | 11 |
| Mindanao | 58 |
| Basilan | 2 |
| Palawan | 32 |
| Sulu Islands | 2 |

The largest island without records is Samar, so we are particularly glad to report on a collection from that island, obtained by Mr. R. C. McGregor in May to July, 1924. Most of the specimens were collected near Paranas (now called Wright), a few kilometers east of Catbalogan on the western coast; nearly all of these specimens were captured at flowers of *Mimosa pudica* Linnæus, between 8 and 10 o'clock in the morning. The other specimens are from Loquilocon, a barrio of Wright, about 10 kilometers inland and with an elevation of about 250 meters.

Names of plants noted in this paper, except *Mimosa pudica*, are determinations by Elmer D. Merrill of material collected by McGregor.

Although the Samar collection includes, as was to be expected, many species already reported from other parts of the Archipelago, there are several novelties which, as far as known at present, are peculiar to the island.

**Nomia iridescens** Smith.

Three females on flowers of *Mimosa pudica* Linnæus, at Wright, July 12.

**Nomia strigata** (Fabricius).

Three females, July 27.

**Nomia levicauda** Cockerell.

Two females, July 2.

**Nomia mimosæ sp. nov.**

*Female.*—Length, about 10 millimeters; anterior wing, 7.3; robust, black, the first four abdominal segments with rather narrow but very conspicuous, shining, entire, light orange tegumentary bands; no ferruginous color on head, thorax, or abdomen; hair of head and thorax thin, mainly white, black on scutellum, very thin and short, partly light and partly dark on mesothorax; mandibles black; flagellum dull ferruginous beneath; clypeus and supraclypeal area shining, with a strong median keel continuous from supraclypeal area to clypeus, the latter also with wavy longitudinal sulci; middle of front, below ocelli, dull and appearing minutely granular; mesothorax and scutellum dull, the punctures so minute and close as to be hardly visible under a lens; postscutellum unarmed, covered with cream-colored tomentum; prothorax and tubercles fringed with similar tomentum; base of metathorax with a curved transverse channel, without cross ridges; tegulæ rather large, sharply pointed behind, light rufotestaceous, with a large black spot in front; wings dusky, stigma and nervures fuscous; legs black, with light hair, some dark fuscous on outer side of middle and hind tibiæ; spurs ferruginous; abdomen moderately shining, the punctures very fine and delicate.

SAMAR, Wright (*McGregor*), July 12, 1924; two at flowers of *Mimosa pudica*.

In the key to Philippine species *Nomia mimosæ* falls closest to *N. longitarsis* Cockerell, from which it is easily known by the keeled face and the much more minutely sculptured mesothorax.

**Anthophora korotonensis** Cockerell.

One male and five females; one female from Loquilocon, May 26; all the rest from Wright, at flowers of *Mimosa pudica*, July 12.

**Anthophora whiteheadi samarensis subsp. nov.**

*Female.*—Length, about 14 millimeters; very robust; hair of head and thorax profusely mixed with black, the general effect dark gray, but fulvous about the tubercles and below the tegulæ; on outer side of hind tibiæ mixed black and white, with a large

black patch apically, on inner side black, but along posterior margin of inner side a band of pure white hair, expanding apically; hind basitarsi with black hair, a tuft of white at base posteriorly; light markings of face very dull yellowish, not white; black areas on clypeus very large, so that the median light band is narrow and gradually comes to a point above; scape with a light mark; tegulæ dull coppery red; wings dilute fuliginous; abdomen with four brilliantly shining blue bands, that on first segment much narrower than others, and suffused with green, the others green at sides in some lights, and in some lights appearing more purple in middle.

SAMAR, Wright (*McGregor*), July 12, 1924; one female at flowers of *Mimosa pudica*.

A puzzling form, intermediate between *A. whiteheadi* Cockerell from Luzon and *A. borneensis* Cockerell from Borneo. The tegulæ are as in *whiteheadi*, the bands more like those of *borneensis*. It appears that the latter should be called *A. whiteheadi borneensis*, at least on the basis of our present information. Dover's recent paper[1] on the *A. zonata* group is a valuable contribution on account of the figures of structural characters, but it does not appear probable that all the forms (excluding such species as *subcaerulea*) can be reduced to three species (*zonata*, *cingulata*, and *walkeri*), each extending from India to Australia, separated on the color of the thoracic pubescence. Dover's dissections show that the various forms he regards as subspecies have structural as well as color characters, and it must probably be said that we do not know enough to be sure of their true relationships with each other. The thoracic hair, known to vary within the species of this genus, is not likely to be a sure guide to affinity. No doubt it will eventually appear that the separable forms of this group are very numerous, and some day they will be properly grouped as subspecies under a comparatively limited number of specific names.

From the Indian *A. cingulifera* Cockerell, the Samar form is separated by the deeper, more intense blue of the abdominal bands; and the distinctly ocherous tint of the thoracic pubescence posteriorly and also in the region of the tubercles (the whole of the light dorsal pubescence being distinctly tinged with yellow). Nevertheless, the relationship appears to be very close, and Dover's contention that *whiteheadi* and *cingulifera* are sub-

[1] The Entomologist No. 737 57 (1924) 226.

species of one species may prove valid. In Dover's key, *samarensis* would go to the Australian *A. cingulata* (Fabricius), differing by the strongly metallic bands and other characters.

**Megachile subrixator** Cockerell.

Five females at flowers of *Mimosa pudica*, Wright, July 12.

**Megachile metallescens** Cockerell.

One female at *Mimosa pudica*, Wright, July 12.

**Megachile atrata** Smith.

One female, Wright, July 12. This must surely be *atrata* of Smith, originally described from the Philippine Islands. However, it is not the species described as *atrata* by Bingham[2] as the clypeus of the Samar insect is quite different, with no median carina. Bingham's species has been separated by Meade-Waldo as *M. atratiformis*. The scutellum of the Samar bee, however, is very coarsely sculptured, and agrees better with Meade-Waldo's account of *atratiformis* than with what he says of *atrata*. The Samar bee agrees with one from Amboina, from F. Smith's collection, determined by him as *atrata*. It is very close to *M. lachesis* Smith, but with paler wings and shining mesothorax. The bee collected by McGregor at Manila, which has been regarded as the female of *M. lachesis nigrolateralis* Cockerell, is this same *M. atrata*, and apparently *nigrolateralis* (based on the male) falls as a synonym.

**Lithurgus scabrosus** (Smith).

One of each sex, Wright, July 12.

**Ceratina philippinensis** Ashmead.

One female, at flowers of *Mimosa pudica*, Wright, July 12.

**Xylocopa fuliginata** Perez.

Eight males, June 13 to July 12; one from Wright, July 12, at flowers of *Mimosa pudica*. Four females from Loquilocoh, May 30 to June 4; one, June 4, at flowers of *Melicope triphylla* Merrill.

**Xylocopa fuliginata var. indecisa var. nov.**

*Female.*—Wings very dark, with brilliant blue-purple colors; posterior part of mesothorax more sparsely punctured; abdomen distinctly green, but the color obscure and only well seen on

[2] Hymenoptera, Fauna Brit. India 1 (1897) 475.

comparison with black. One specimen has a few white hairs on the sides of the thorax, below the tegulæ; the other lacks these.

SAMAR, Loquilocon (*McGregor*), type, June 12, at white flowers of *Donax cannaeformis* K. Schumann; another specimen, May 31.

This form caused a great deal of trouble, because of its composite relationships. The color of the wings is not so rosy purple as in *X. collaris*, yet much more like that than typical *fuliginata*, of which Perez says: "Ailes beaucoup plus sombres, brunes avec de très faibles reflets d'un bleu violacé." The small amount of hair at sides of thorax of one specimen marks an approach to *collaris*, and the sparsely punctured posterior part of mesothorax also agrees with that species. The larger size, greenish abdomen, and strong median ridge on the much more closely and less densely punctured clypeus at once separate it from *X. ignita* Smith. Maidl has treated *X. fuliginata* as a synonym of *X. amethystina* "Fabricius," Gribodo, but as Dusmet remarks, it is impossible to identify *amethystina* from the brief description of Fabricius. We can only accept the traditional identification for an Indian species which is certainly not *X. fuliginata*. Dusmet received a bee from Staudinger labeled *X. amethystina*, collected in Palawan. He describes it as a new species, *X. mazarredoi;* it has the wings without very strong violaceous color, and is otherwise quite distinct from the variety now described. Meade-Waldo, in the British Museum collection, placed *X. ignita* as a synonym of *amethystina*.

The greenish abdomen of *indecisa* represents an approach to *X. nigrocaerulea* Smith, but that differs greatly in the color of wings and punctures of thorax.

**Mesotrichia philippinensis samarensis** subsp. nov.

*Female* (*type*).—Pale pubescence on hind part of thorax and base of abdomen reddish yellow, the raw sienna of Ridgway's Nomenclature; wings with the greenish color of the subspecies *chlorina* Cockerell; apical field rosy purplish. There is less white hair on the face than in *chlorina*, the general effect in lateral view being black, with hardly any white. The specimen chosen as the type has the hair arranged practically as in *philippinensis*, the light reddish hair being confined to the sides of the scutellum, except a few hairs along the posterior margin; but occasional specimens have the hair light right across, as in *chlorina*. The type specimen has the anterior wings 18.5 mil-

limeters long. There is a very large robust specimen, with the reddish hair on scutellum reduced to small lateral patches, and the anterior wings fully 22 millimeters; this may be separable when more specimens have been obtained.

*Male.*—Like the form which Perez described as *X. euchlora*, which is doubtless the male of *X. philippinensis*. There is one male which has a rather different aspect, with the hair of thorax anteriorly suffused with reddish (compare *M. vachali* Perez), and the lateral portions of the apical yellow band on clypeus claviform. Perhaps this is the true male of *samarensis*, and the others are different.

Sixteen females, May 31 to July 12; ten from Wright, July 12, collected at flowers of *Mimosa pudica*. Others at flowers of *Fagraea racemosa* Jack. and *Albizzia saponaria* Blume. Four males, May 26 to July 12. The one from Wright, July 12, at flowers of *Mimosa pudica*, is the one with reddish hair on thorax. The others were taken near Loquilocon in May and June.

*Xylocopa maesoi* Dusmet, from Tayabas and Dolores, is certainly a form of *M. philippinensis*, not appreciably differing from *chlorina*.

**Mesotrichia canaria sp. nov.**

*Female.*—Length, about 23 millimeters; anterior wing, 21; distance between wings, 9. Robust, with the light hair of thorax light canary yellow. Very much like *M. ghilianii* Gribodo, but smaller; the wings a beautiful green, practically without purple; the yellow of thorax above more extensive, with a conspicuous line above tegulæ, so that the disk of mesothorax has a very large subquadrate black patch, broader than long, its outline more or less trilobed posteriorly, the middle lobe the largest; extreme base of wing a tuft of yellow hair (a black tuft in *ghilianii*); first abdominal segment with the yellow hair becoming thin and evanescent posteriorly (covering the segment in *ghilianii*); abdomen much less densely and roughly sculptured, the surface shining, not conspicuously hairy; face with a little light hair among the black, and cheeks with very light hair anteriorly. The ocelli are much smaller than in *M. ghilianii*. In both species the clypeus has a conspicuous median smooth line or band.

This is perhaps still nearer to *Mesotrichia nigroplagiata* (*Xylocopa nigroplagiata* Ritsema), from the Aru Islands, but the Samar insect is larger and has a large yellow area on pleura as in *M. ghilianii*. The color of the wings is also different, and

the hair on the cheeks differs. It is not impossible that the greenish-haired males referred to above, having the appearance of *X. euchlora*, really belong to *M. canaria*.

SAMAR, Wright (*McGregor*), July 12, 1924; twenty-one females collected at flowers of *Mimosa pudica*. A very handsome species.

**Mesotrichia ghilianii** Gribodo.

Twelve females, May 22 and May 26, many at flowers of *Fagraea racemosa* Jack.

**Trigona biroi** Friese.

Eighteen workers, May 21 to July 4. They were taken at Loquilocon, at flowers of *Citrus;* at Wright, at flowers of *Mimosa pudica;* and one specimen at flowers of *Melicope triphylla* Merrill.

**Apis binghami** Cockerell.

Thirty-five workers, May 31 to July 12, from Loquilocon and Wright.

**Apis indica nigrocincta** Smith.

Twelve workers, May 31 to July 12; Loquilocon, at *Aspidopteris elliptica* Jussieau; Wright, at *Mimosa pudica*.

# DIPTERA OF MEDICAL AND VETERINARY IMPORTANCE, I

## TYPES OF OLDER AUTHORS IN CONTINENTAL MUSEUMS

By W. S. PATTON

*Of Edinburgh University*

In several recent papers I have recorded my studies of Walker's and Bigot's types of *Musca* and certain of the Calliphorinæ of the former. As a result of this work it has been possible to clear up a large amount of synonymy, and at the same time to settle the identity of many of the species described by these authors. Further work on the revision of the species of the genus *Musca* had, however, to be abandoned until I had an opportunity of examining the types of Fabricius, Wiedemann, Macquart, Loew, Thomson, Stein, Karsch, Schiner, Bezzi, Villeneuve, and others, in various public and private collections on the Continent. A grant from the Earl of Moray Fund for Original Research of Edinburgh University, however, made this possible, and I wish to take this opportunity of thanking the trustees of the fund for this grant. As I collected a large amount of information regarding the various collections, particularly those of the Diptera, and also examined many types, it has occurred to me that some of my notes may be of use to others. At the same time I will take this opportunity of dealing with some Diptera of medical and veterinary importance.

Although the main object of the tour was the study of the existing types of the Muscinæ and Calliphorinæ, I went prepared to examine the types and specimens of any insects directly or indirectly concerned in the transmission of disease-causing organisms to man and animals.

For an extensive tour of this nature to be successful it is first necessary to be certain of the whereabouts of the various collections containing the types to be examined; and this necessitated a large amount of correspondence with directors of museums and others in charge of dipterological collections. I am particularly indebted to Professor Bezzi for the very complete and, as it proved, accurate information regarding the

whereabouts of the collections containing the types of the authors mentioned above. Having gained all this information it was possible to plan my route so as to minimize the time which must of necessity be spent in traveling.

When one sets out to examine types, particularly those of the older authors, and expects to do so in the minimum of time and with the certainty of arriving at their identity, it is most important to take with one specimens believed to be conspecific, and not to trust to one's memory. The specimens can thus be examined side by side with the types and, if found to be identical, can be so labeled. A good binocular microscope is a necessity. Prepared in this way it is possible in a very few minutes, and often with only one examination, to arrive at a final conclusion regarding the identity of the type.

Several months were spent in making notes and bringing together conspecific specimens, several hundreds of which were taken. I left Edinburgh on July 19, 1922, for Hamburg where I spent two days before going on to Kiel. I had an opportunity of going through the Institut für Schiffs- und Tropen Hygiene, and of examining the material used in teaching medical entomology and parasitology. Doctor Meyer, whom I met several years ago in Madras, spent the best part of a day showing me this fine institution, where the German medical graduate has an opportunity of studying tropical diseases, tropical parasites, and their arthropod carriers. The museum contains a very rich collection of pathological specimens illustrating the various diseases of the Tropics, and the parasites and their carriers are extremely well displayed. A large number of them had been collected by Doctors Fülleborn and Meyer during their world tour, and it was interesting to see again among them specimens which had been obtained at Madras. The diagrams and illustrations used for teaching purposes and the very complete set of lantern slides were most instructive. The insect rooms, where tropical insects such as *Stegomyia fasciata* and tsetse flies are hatched out and kept alive, were of special interest. The housing of the animals used for experimental purposes is very complete, and each investigator has a room where his special animals are kept. The arrangements and fittings of the work rooms, and the library in particular, gave one the impression that the minutest details had been thought out in planning this institution. I had an opportunity of meeting and discussing many problems of mutual interest with several members of the staff, especially Doctor Martini and Madame Sikora. I wish to take this opportunity

of thanking Professor Nocht and Doctor Meyer for their kindness in showing me so much of interest in so short a time.

KIEL

I had long looked forward with keen interest to examining the Fabrician collection of Diptera, and was full of hopes of settling once and for all the identity of many of the species of which I have long been in doubt. Anyone who has attempted to identify the species of Fabricius, *Musca nebulo* for instance, from the meager descriptions will know how impossible it is to be certain of their identity in the absence of the types. The description of *nebulo* would apply to many of the Oriental species of the genus, and the locality, in this case at any rate, is of no use.

The largest part of the entomological collection of Fabricius is preserved in a room in the Museum of the Zoölogical Institute of the university of which Geheimrat Professor Doctor Brandt is the director. As far as I am aware no dipterologist has within recent years examined the Diptera in the collection. When Doctor Reibisch, who kindly showed me the collection, produced the boxes containing the Diptera my hopes were dashed to the ground, for the whole of this valuable and historical collection is destroyed, and there now remain only pins, labels, and débris. Fabricius evidently pinned his specimens on beeswax, which had become caked and cracked together with the floors of the boxes, with the result that beetles and other destructive insects had found their way in and had destroyed the specimens. Doctor Reibisch told me that the collection had been in this condition for a long time, but for how long he did not know. The type of *Musca nebulo* is completely destroyed, but there was enough of *Musca megacephala* left to enable me to identify it as the well-known Oriental species *Chrysomyia dux* Eschscholtz (*flaviceps* Macquart).

It will be remembered that Fabricius stated he obtained the type of *megacephala* from Doctor Ifert from Guinea, West Africa, and yet the specimen is that of a species which to my knowledge has not been recorded from any part of the Ethiopian Region (there is one specimen in the British Museum collection from Reduit, Mauritius). Both Professor Bezzi and Doctor Villeneuve told me that they had never seen a specimen from Africa. On examining the label bearing the name *megacephala* in the handwriting of Fabricius, I noted that he had written the words, "Ex. Ind. Or.," on the reverse side, clearly showing that the type came from India, not from Africa. Professor Bezzi

drew my attention to the fact that the type had been given to Fabricius by a medical man, and suggested the possibility of it being the important Old World myiasis-producing calliphorine *Chrysomyia bezziana,* so that it was important to make certain of the identity of this type. I have no hesitation in saying that the type of *megacephala* is the common bluebottle of the Oriental and Australian Regions. Although I have not seen the type of *dux,* and do not know whether it still exists, I have seen the type of *flaviceps,* and note that it is identical with *dux.* This is, however, one of the exceptional instances in which it is possible to be certain of the identity of a species from the description alone, for both Eschscholtz and Macquart clearly state that the males of their species have a large faceted area on the eyes, and this is of course a striking characteristic of the male of *megacephala.* As a result of my examination of the type of *megacephala* and the discovery of the region from which it came, it is quite clear that this is only another locality mistake, a common occurrence in Fabricius's dipterological writings. The following is the complete synonymy of *megacephala;* the names marked with an asterisk indicate that the type has been examined.

**Chrysomyia megacephala** Fabricius.

*Chrysomyia* (*Musca*) *dux* Eschscholtz.
*Chrysomyia* (*Lucilia*) *flaviceps* Macquart.*
*Chrysomyia* (*Musca*) *remuria* Walker.*
*Chrysomyia* (*Musca*) *bata* Walker.*
*Chrysomyia duvaucellii* Robineau-Desvoidy.
*Chrysomyia* (*Lucilia*) *javana* Schiner.*
*Chrysomyia* (*Lucilia*) *dives* Bigot.*
*Chrysomyia* (*Lucilia*) *saffranea* Bigot.*
*Chrysomyia* (*Somomyia*) *pfeifferi* Bigot.*
*Chrysomyia* (*Somomyia*) *erythroopina* Bigot.*
*Chrysomyia* (*Lucilia*) *cyaneocincta* Bigot.*
*Chrysomyia* (*Lucilia*) *cyanescens* Loew.*

I have no doubt that Robineau-Desvoidy described this species several times, but it is not possible to be certain of his species in the absence of the types, and these are all now lost. Unfortunately, there are no other types left in the original Fabrician collection which could possibly be identified, and were it not that Wiedemann studied the specimens when they were still in good preservation many of the species of Fabricius would have to be finally deleted from the literature as unrecognizable. In this connection it is interesting to note that, as Wiedemann points out, Fabricius had not a single specimen of *Musca domestica*

Linnæus, labeled by him as such in his collection; and I could not find a pin with any label *Musca domestica* in Fabricius's handwriting. Wiedemann says that *Musca ludifica* Fabricius, which is generally regarded as a synonym of *corvina* Fabricius, is nothing more than a female *domestica* Linnæus. Wiedemann further points out that the types of *M. corvina* and *M. umbraculata* Fabricius at Kiel and the cotypes at Copenhagen are also *domestica*. I have no doubt regarding the specimens at Copenhagen. *Musca corvina* Fabricius, *M. ludifica* Fabricius, and *M. umbraculata* Fabricius must therefore be included in the synonymy of *domestica* Linnæus in the future.

Doctor Reibisch showed me a few of Fabricius's types of the Tabanidæ, which had been incorporated in the museum collection. It was very easy to recognize among these types the species *Tabanus striatus, T. javanus, T. borealis, H. roralis, Calliphora dispar* Macquart, *C. pellucidus,* and *P. amboiensis,* all of which are in good preservation.

The types of Microlepidoptera and most of the Coleoptera are in good preservation, but most of the species of the other orders described by Fabricius, as well as many arthropods, are destroyed. Some of the types of the Coleoptera are in Glasgow, Doctor Reibisch told me.

## COPENHAGEN

The Zoölogical Museum of the University of Copenhagen contains a number of valuable entomological collections, those of the Diptera named by Fabricius and by Wiedemann being the more important. Although Doctor Lundbeck was not in Copenhagen at the time of my visit, Mr. Henriksen kindly gave me access to these collections.

Wiedemann's work on the exotic Diptera is of importance, not only because of the excellence and the accuracy of his descriptions, but also because he examined the types and cotypes of Fabricius and had access to the large and important collections of Westermann, Trentepohl, and von Winthem, and also to types in Berlin (Hoffmannsegg), Frankfurt, and Leyden. However, though Wiedemann enjoyed many advantages over Robineau-Desvoidy and Macquart in being able to examine so many types and specimens of a given species, like all these old authors, he does not appear to have seen a really good series of any of the exotic species he described. Yet Wiedemann made very few mistakes, and showed himself to be a master of his subject; no dipterologist can afford to ignore his species.

All the specimens at Copenhagen are in excellent preservation, and I was able to determine them accurately. Doctor Villeneuve, it will be remembered, has already examined some of the types of Calliphorinæ and Tachininæ. The following notes on some of the species may be of interest:

FABRICIAN COLLECTION

**Musca megacephala** Fabricius (three females).

One of the specimens bearing the label *megacephala* is the well-known African species described by Wiedemann under the name *putoria*. The second without any label is the species *Lucilia pulchra* Wiedemann, and the third is the true *megacephala*. In his examination of two of these specimens Doctor Villeneuve was apparently under the impression that they were the types of *megacephala*, whereas they are hardly even cotypes; the type of *megacephala*, or what remains of it, is at Kiel. Villeneuve came to the conclusion that *megacephala* referred to by Bezzi from Africa was not the *megacephala* of Fabricius, but a distinct species, which he named *bezziana* without, however, giving a description of it or specifying any type. Professor Bezzi considers the specimens he has at Turin are the types. When at Turin I compared Indian specimens with them.

**Musca sacra** Fabricius.

Villeneuve has already pointed out that this calliphorine, said to have come from the Cape of Good Hope, is obviously not an African species, the eyes being densely hairy. This is another locality mistake made by Fabricius, for the specimen is a typical example of *Calliphora quadrimaculata* Swederus; *sacra* then becomes a synonym for this species.

**Musca jejuna** Fabricius (three females).

One of the specimens is not conspecific with the other two. I note Surcouf appears to have had one of these sent him when he was preparing his Revision des Muscidae Testaceae. It is by no means certain which specimen he had. Here again I would like to point out that the type of *jejuna* was at Kiel, and Surcouf rather arbitrarily assumes that the specimen sent him from Copenhagen is the type. Wiedemann examined the types at Kiel and pointed out that the specimens from Bengal were more typical, those from Tranquebar having been faded when he saw them; therefore it is much more important to examine Wiedemann's specimens than those of Fabricius at Copenhagen, because there is very little doubt that he would have compared

his specimens with the types. Two of the specimens are identical with the *jejuna* in Westermann's collection; the third is the species known as *Bengalia lateralis* Macquart, and this is identical with the specimen labeled by Wiedemann *Musca jejuna* var., Tranquebar. This is a good example of the great care which should be observed in examining the types of the older authors.

**Musca nebulo** Fabricius.

The two specimens, a♂, male and a female, are hardly even cotypes; the latter is a typical specimen of *sorbens* (*humilis*), the former the Indian house fly known as *nebulo*. The type of *nebulo* was at Kiel, but as already noted is now destroyed. Fabricius confused all the species of *Musca* sens. str. he examined, and it is therefore not surprising to find him confusing these two. What his type of *nebulo* was, it is now impossible to be certain; but it is clear it may have been one or other of these two species. I do not see any use in now changing this name, and shall continue to call the Indian house fly *nebulo*.

**Musca stygia** Fabricius.

The cotype, a female without a label, but said to have come from Newfoundland. Schiner pointed out that this is a locality mistake, the specimen having in all probability come from New Zealand. It is a specimen of the well-known golden-haired blowfly of the Australian Region, variously known as *Pollenia villosa* Robineau-Desvoidy, *Musca australis* Boisduval nec Macquart, and *Musca laemica* Walker.

In the collection I also noted two specimens of *Lucilia pulchra*, labeled by Fabricius "affinis *megacephala*," and one male specimen of *megacephala*, labeled "Ex Ind. Or."

WESTERMANN'S AND TRENTEPOHL'S COLLECTIONS

**Musca megacephala** Fabricius.

Two males from Batavia are typical specimens of the Fabrician species noted above. It is clear from these specimens that Wiedemann had no doubt regarding *megacephala* from the Oriental Region, having seen the type. However, with these two specimens is a third, from Guinea, which is a male of *putoria* Wiedemann; there are also a male and a female, from Guinea, of *putoria*. It is evident that Wiedemann was on the lookout for *megacephala* from West Africa, but it is surprising to find he confused one of his own species with the Indian *megacephala*, which is a very distinct fly.

**Musca marginalis** Wiedemann.

Typical specimens of this well-known blowfly of the Ethiopian Region; the type is in the collection at Vienna.

**Musca chloropyga** Wiedemann.

A female from the Cape of Good Hope and two other specimens from St. Helena; this is the well-known Ethiopian species with dark wing base and the characteristic presutural thoracic stripes.

**Musca viridaurea** Wiedemann.

The male from Batavia is a species of *Thelychaeta* Br. and Berg. It is not an uncommon species in the hill stations of India, where it may be mistaken for a *Chrysomyia*. The type is in the Vienna collection.

**Musca munda** Wiedemann.

The type, a female from Batavia, is a female of *viridaurea*, which is the older name.

**Musca planiceps** Wiedemann.

The type, a male from Java, is the Oriental species *Musca cingalaisina* Bigot. Van der Wulp, Catalogue of the Described Diptera from South Asia, places this species in the genus *Cyrtoneura* Macquart (*Muscina*), a determination which was evidently made from the description.

**Musca mediana** Wiedemann.

A cotype, a male from China, is a small specimen of the species recorded by me under the name *Musca albomaculata* Macquart (*dorsomaculata* Macquart; *convexifrons* auctores nec Thomson; ? *setigera* Awati). The type of *mediana* is in von Winthem's collection at Vienna, and the specimen which I now have before me is not this species but is *sorbens* (*humilis*), so that *mediana* becomes a synonym of *sorbens*.

**Musca xanthomelas** Wiedemann.

The type, a female from Java, is the female of *mediana* in this collection, and is now the correct name for the species recorded under the name *albomaculata* mentioned above. It must not be confused with *Musca xanthomela* Walker, which name sinks as a synonym for *ventrosa* Wiedemann; there is, therefore, no necessity to change Wiedemann's name.

**Musca humilis** Wiedemann.

The cotype, a male from China, is *sorbens* Wiedemann; the type of *humilis* is in the Vienna collection.

**Musca latifrons** Wiedemann.

The type, a female from Macao, is a specimen of *sorbens;* a small female is also this species.

**Musca lusoria** Wiedemann.

Two males, the type and cotype, from the Cape of Good Hope. This is the common African species with four well-separated thoracic stripes; vein $R_{4+5}$ has small bristles all along its ventral surface. The first abdominal tergite is black; the second has a narrow black median stripe with some dark patches on each side of the middle line of the anterior border, and well-marked silvery admedian stripes; the third tergite is brown with a dark median stripe and silvery admedian ones, the lower border has a dark band of varying width.

This species is widely distributed in Africa and has a white puparium like the Oriental *Musca bezzii;* it has been frequently confused with *Musca autumnalis.* I have not seen a specimen of *autumnalis* from any part of Africa.

**Musca cuprina** Wiedemann.

The type, a female from China, is the species of *Lucilia* known as *argyricephala* Macquart (*serinissima* Walker).

**Musca ligurriens** Wiedemann.

The type, a male from Java, in Trentepohl's collection is the Oriental race of *Chrysomyia albiceps* var. *putoria;* it is certainly not a *Lucilia* as stated by Brauer.

**Musca lauta** Wiedemann.

The type, a female, is the common Oriental and Australian *Cryptolucilia* (*Pseudopyrellia*) *lauta.*

Space will not permit of my dealing with any other types examined at Copenhagen.

## STOCKHOLM

The Natural History Museum is situated in the country, a little outside Stockholm. The whole of the upper floor of this fine building is devoted to entomology; each of the more important orders has a room to itself, and the arrangements for housing the various insects are complete and up to date. This section of the museum contains many valuable entomological collections, and is particularly rich in coleopterous material. Among others, it contains types of Boheman (Cassididæ), Stål (Chrysomelidæ), Aurivillius (Cerambycidæ), Schönherr and

Chevrolat (Curculionidæ), Salberg (Vega Expedition), De Geer, Paykull, and Sjöstedt (Cameroons and Kilamandjaro Expeditions), and Mjöberg (Australian Expedition); there are many types of other orders as well. The collection of Diptera contains the important types of Thomson (Fregatten Eugenies Resa) and those of Speiser and Sjöstedt (Cameroons and Kilamandjaro Expeditions).

The true identity of the species of *Musca* described by Thomson has long been a puzzle to me and it was very gratifying to find them in such good preservation, and the whole collection so well arranged that it was easy to identify them. I wish to take this opportunity of thanking Professor Sjöstedt for giving me access to these collections, and for showing me so much of interest in his department. The following notes on some of the types examined at Stockholm may be of interest:

**Musca convexifrons** Thomson.

The type and only specimen, a male, is the well-known Australian species *Musca fergusoni* Johnston and Bancroft (*Musca australis* auctores nec Macquart, nec Boisduval). The Oriental species which I have long called *convexifrons* is now *Musca xanthomelas* Wiedemann, a quite different species. I do not know who is responsible for determining this common hæmatophagous Australian species as *australis* Macquart, because the specimens named *australis* in Macquart's collection at Paris are nothing more interesting than *domestica* Linnæus. The name *australis* must now be added to the already long list of synonyms of *domestica*.

**Musca bivittata** Thomson.

The type is a specimen of *sorbens* Wiedemann, as already noted by Stein.

**Musca niveisquama** Thomson.

The type, a male, is the species *vetustissima* Walker; the two females from the Moluccas are also this species; but two males from the Moluccas, one of which is labeled *domestica* by Austen, are both the Indian *nebulo*. Evidently one of these specimens was sent to Stein, who labeled it "*domestica* L., var. fronte angusta." Neither of these two specimens is conspecific with the type of *niveisquama;* this name now becomes a synonym for *vetustissima*. I had previously recorded this species under the name *Musca pumilla* Macquart, but as I could not find any types or named specimens of *pumilla* in Macquart's collection at Paris

I have decided to drop this name, Macquart's species being quite unrecognizable from his description alone.

**Musca angustifrons** Thomson.

The type, a female from Ascension Island, is a typical specimen of *sorbens*, as already pointed out by Stein; another specimen, from Celebes, is also this species. However, two females from Celebes and one male from Ascension are *vetustissima*.

**Musca flavinervis** Thomson.

The type, a female from Ross's Island, is a specimen of *Musca vicina* Macquart. I propose to adopt this name for the species I have noted as *Musca domestica* atypical in my Notes on the Oriental Species of the Genus Musca. The types of *vicina* are typical specimens of this widely distributed tropical house fly; *vicina* is the oldest name of which the type still exists.

**Musca lasiopthalma** Thomson.

The type is a specimen of *Musca interrupta* Walker, and the name becomes a synonym for Walker's species, as suggested by Bezzi.

SJÖSTEDT'S KILAMANDJARO COLLECTION

It will be remembered that Speiser described the Muscidæ in this collection; among them I noted the following:

**Calliphora parasacra** Speiser.

The type and another male are typical examples of the African species *C. croceipalpus* Jaenn. (*vicarians* Schiner).

Several specimens of *Musca* determined by Speiser as *spectanda* Wiedemann are not that species but are *Musca lusoria* Wiedemann. A female included with these is an example of *Musca gabonensis* Macquart (*aethiops* Stein). The male labeled *Musca corvina* F., is certainly not that species but is also *Musca gabonensis* Macquart (*aethiops* Stein).

I also had an opportunity of examining that curious species of *Stomoxys, ochrosoma* Speiser, a yellowish fly with a long yellow proboscis. I also took the opportunity of studying the adult of *Gyrostigma* (*Spathicera*) *meruensis* Sjöstedt, which was bred from a larva recovered from the stomach of the black rhinoceros.

BERLIN

The dipterological collections in the Zoölogical Museum of the University in Invaliden Strasse is one of the most important in

Europe, as it contains many valuable types and specimens determined by Loew, Karsch, Grünberg, Enderlein, and others. I spent a week examining a large number of the specimens, but it would take the best part of a year to work through these immense collections; Doctor Enderlein told me he had as yet been able to sort out only a few of the undetermined specimens, as he had been in charge of the Diptera only about two years. Anyone making a serious study of the Diptera, and particularly the Muscidæ and the Tabanidæ, should certainly pay a visit to this museum. It contains Loew's celebrated collection which is still kept separate and is intact. The collection of Tabanidæ is the largest I have had the opportunity of examining; it is very rich in Ethiopian, Nearctic, and Neotropical species. With this material at hand Enderlein has been able to publish his new classification of the Tabanidæ. Enderlein's collection of European species of *Simulium* and their early stages is a very complete one, containing long series of the different species. I am much indebted to Dr. Günther Enderlein for all the trouble he took in searching out specimens I particularly wished to see. A few notes on some of the more important types and specimens may be of interest.

**Musca pungoana** Karsch.

The type, a female, is the well-known *M. ventrosa* Wiedemann.

**Musca lucidula** Loew.

The type, a female, is the metallic species of this genus in which cell $R_5$ is closed at the margin of the wing.

**Musca fasciata** Stein.

The types of this species from the Seychelles are in the British Museum, but there are many males and females at Berlin labeled types by Stein. The male of this species has two broad thoracic stripes, but in some specimens I noted that they are divided before the suture; in the female there are four stripes. In both sexes the first abdominal tergite is black, and there are some dark basal bands on the second and third tergites.

**Musca crassirostris** Stein.

The types of this species are, I understand, in Professor Becker's collection, but those of *Musca inferior* Stein and *M. pollinosa* Stein are at Amsterdam. There are several specimens of *crassirostris* in Berlin determined by Stein. I have no doubt therefore regarding the identity of this species. Professor de

Meijere kindly sent me the types of *Musca inferior* and *M. pollinosa*.

**Haematobia lutosa** Grünberg.

The type is a male from Kenya Colony; the following is a short description of it: Eyes a little separated, front about one-eighth the width of the eye. Face silvery, epistome wide and prominent. First and second antennal segments reddish yellow, the third mouse gray; the arista has eleven hairs on its dorsal surface and six below; the palpi are almost as long as the proboscis, they are yellow and broadly club-shaped with short, black bristles. Proboscis yellow except the tip which is black. The thorax is dark orange with a broad, ill-defined median dark stripe in front of the suture; postsutural area grayish just in front of the scutellum; sides of thorax yellowish with two bright yellow patches above the middle coxæ; sternopleural bristles arranged 1 : 1. Abdomen mouse gray without any definite markings. Wings with bend of vein $M_{1+2}$ as in the other species of this genus; veins $R_{2+3}$ and $R_{4+5}$ without any bristles at their bases. Legs yellow.

**Haematobia nudinervis** Stein.

Several specimens labeled types from Formosa by Stein are the species known as *Bdellolarynx sanguinolentus* Austen. The types of *Haematobia rufipes* from Formosa are also this species. As *nudinervis* was described a year before *sanguinolentus*, this common Oriental bloodsucking muscid must in future be known by the former name.

I have now made a careful comparative study of a long series of *nudinervis*, including Stein's types and cotypes as well as many specimens from the Oriental Region, also of *sanguisugens* Austen from many localities in India, of *stimulans* Meigen, and of the type and only known specimen of *lutosa* Grünberg, and have come to the conclusion that the characters used to define the genus *Bdellolarynx* are not of generic value; *Bdellolarynx* is therefore sunk as a synonym of *Haematobia*.

**Glossinella shillingsi** Grünberg.

There are a number of specimens of this species from East Africa, but they are unfortunately in a very bad state of preservation. This fly is small, grayish, with yellowish legs and yellowish palps; the arista has five hairs on the dorsal side. The abdomen is grayish. I have no doubt that *shillingsi* is a species of *Lyperosia* and is in all probability *L. minuta*.

**Stomoxys sellata** Grünberg.

The type, a male from North Cameroons, has two broad, black thoracic stripes on a rather bluish gray ground color; the abdomen is brownish yellow.

**Stomoxys bilineata** Grünberg.

The type, from East Africa, has a grayish thorax with four well-separated dark thoracic stripes, the inner pair better marked than the outer which are almost wanting before the suture. The abdomen is yellowish with dark basal bands on the second and third abdominal tergites.

**Stomoxys glauca** Grünberg.

The type, from the Cameroons, has two well-marked black thoracic stripes, and a silvery gray thorax; it is probably identical with *Stomoxys nigra* Macquart.

**Stomoxys korogwensis** Grünberg.

The type has two broad, black thoracic stripes, and a grayish yellow abdomen.

**Stomoxys inornata** Grünberg.

The type, from the Cameroons, is a dark species with two very broad thoracic stripes in the male; the eyes are rather close together.

**Stomoxys brunnipes** Grünberg.

A species from the Cameroons; in the female there are two thoracic stripes separated before the suture, but in the male the two stripes are broad. The abdomen has well-marked bands; the face is yellow and the front of the male rather narrow.

**Gasterophilus lativentris** Loew, from Courland.

The type, a female, is in a bad state of preservation. The abdomen is yellow and the tergites, which are all that is left, are broad and unspotted. The face is reddish yellow, the third antennal segment very short, and the arista straight and thick. The wings are unspotted. I consider it is only a faded, rather pale specimen of *G. intestinalis*.

**Gasterophilus nigricornis** Loew, from Bessarabia.

The type is a female, and has a whitish yellow thorax and black abdomen with yellowish white hairs. The specimen is not in good preservation and appears to be a rubbed example of *G. veterinus*.

VIENNA

The Entomological Department of the Zoölogical Museum at Vienna contains the valuable and ancient collections of von Winthem and Wiedemann, especially the typical specimens of the latter; also many types of Schiner (Diptera Novara Reise), Doleschall, Brauer, and a large collection of the Muscidæ calypteratæ named by the famous Brauer. At the time of my visit to Vienna the Muscidæ belonging to von Winthem's and Wiedemann's collections were at Treptow where the late Doctor Stein had them at the time of his death in 1921. The Calliphorinæ are at present with Doctor Villeneuve at Rambouillet. Doctor Zerny, who is in charge of the Diptera, promised to send me the types I wanted to see as soon as they were returned from Treptow, and I now have these before me. Some notes on Wiedemann's types of *Musca* as well as some other specimens in the collection at Vienna may be of interest.

On examining the types of *Musca sorbens, M. humilis, M. spectanda,* and *M. mediana,* I find that they are all identical, and *sorbens* is now the oldest and I believe the final name for this species; as I have already pointed out, *latifrons* Wiedemann is also this species. It is interesting to note that Stein had already come to this conclusion and had some time before his death attached the label "*humilis* Wied." to each of the above types. It was very surprising to me to find such a careful worker as Wiedemann describing a single species no less than five times; *sorbens, humilis,* and *spectanda* are described on pages 418 and 419 of volume II of his Aussereuropäische zweiflügliche Insecten. Until now I had considered *Musca spectanda* Wiedemann was the large, hæmatophagous, African species with two broad thoracic stripes, of which *Musca alpesa* Walker is usually regarded as a synonym. *Musca spectanda* now turns out to be a rather small male of the common *sorbens;* the large African species must in future be known as *Musca alpesa* Walker.

It was a matter of great surprise to me that none of the old collections of exotic Diptera which I examined contained a single specimen of *Musca crassirostris* Stein, one of the commonest Oriental species. However, in von Winthem's collection which I now have with me there is a female of this species labeled by Wiedemann *Musca inconstans* and, though this species is mentioned in the index of his volume II, without a number, it is nowhere described, and Professor Bezzi tells me he can find no reference to this name in the literature. This name therefore

cannot be used, and the name of the species must remain as *crassirostris*. It is, however, interesting to know that Wiedemann had examined this fly nearly a hundred years ago, and that the identical specimen is still in good preservation, and is a typical example from India.

**Musca ventrosa** Wiedemann.

The type, a male, with a red label from China, is in von Winthem's collection together with a male from Sumatra and a female from China.

**Musca albina** Wiedemann.

The type, a female from India, is also in von Winthem's collection. Recently I found three specimens of this fly in Colonel Yerbury's collection from Ceylon, now in the British Museum. Although I have made very extensive collections of species of *Musca* in India, I never once saw this species. There is only one specimen in the Indian Museum collection from Baluchistan. Wiedemann was evidently doubtful of his species, for on the label he wrote "*albina* Wied., *humilis* ♀ var." *Musca albina* is, however, quite distinct from *sorbens*.

**Musca osiris** Wiedemann.

The type, a male from Egypt is a typical example of *Musca vitripennis* Meigen. It was of some importance to be certain of this type, because it might quite well have been a male of *albina*.

**Musca hortensia** Wiedemann.

The type, a male from Java, is the common Indian *Morellia hortensia* Wiedemann.

**Musca albiceps** Wiedemann and **M. putoria** Wiedemann.

During my visit with Doctor Villeneuve at Rambouillet, I took the opportunity of examining the types of Wiedemann's *albiceps* and *putoria*. It will be remembered that the former was described from Sierra Leone, and the latter from the Cape of Good Hope. These two species are considered to be distinct, the eyes of the male of the former being well separated, those of the latter close together; but these are variable characters, as can be easily noted in any large collections from different parts of Africa. Recently Doctor Villeneuve drew my attention to the presence of a bristle below the mesothoracic spiracle in *putoria* and its absence in *albiceps*. Both types show these characters. I have examined a small collection of *albiceps* from Palestine sent

me recently by Doctor Buxton and, though the majority have no mesothoracic stigmatic bristle, some of the specimens have it on both sides, and yet they are in other respects indistinguishable. I am not in a position to say whether the presence or absence of a single bristle is of importance in separating these two species. The Oriental form has the mesothoracic stigmatic bristle and is identical with *putoria*. *Musca ligurriens* Wiedemann from Java and China is this form. I consider it is best in the meantime to regard *putoria* as a variety of *albiceps*. The Australian form known as *rufifacies* Macquart is identical with the African *putoria* and the Indian form; it has a mesothoracic stigmatic bristle. I shall refer to this species farther on.

The collection of Calliphorinæ at Vienna contains the following, among others:

A number of specimens of the typical *Chrysomyia megacephala* from Canton, belonging to von Winthem's collection; also the same species labeled *flaviceps* Macquart from Singapore, all determined by Brauer. This little collection contains a number of specimens of the Oriental *putoria* along with the typical *megacephala*, clearly showing that Brauer also confused these two species. The collection also contains one specimen of *megacephala* labeled *javana* Schiner (Java), and many labeled *cyaneocincta* Bigot from the Oriental Region; the latter determination is correct, Brauer having seen the type of *cyaneocincta* in Bigot's collection.

**Lucilia leucodes** Frauenfeld, from Singapore.

This is the species described by Wiedemann under the name *cuprina;* it is an important myiasis-producing species and is identical with *argyricephala* Macquart and *serenissima* Walker.

**Lucilia nesiotis** Schiner, from Palm Island.

This is one of the common Australian species, and is identical with *Lucilia nosocomiorum* Doleschall from Amboina; Walker described it under the name *marginifera*.

*Lucilia pavonia* Schiner from the Nicobar Islands is *albiceps* variety *putoria* Wiedemann.

*Lucilia ispida* Erichson, Australia, is also this species.

*Lucilia selasoma* Erichson is the well-known Australian *Calliphora augur* Linnæus.

*Calliphora hyalipennis* Macquart (*ochracea* Schiner) is the somewhat rare reddish yellow blowfly of Australia.

**Calliphora aureopunctata Macquart.**

I noted that Brauer had attached this name to the bluish Australian species with hairy eyes, yellow stigmata and bases of wings. It will be remembered that Hutton included it under the synonymy of *Calliphora hortona* Walker. The other species, rather similar but with bare eyes and not such markedly yellow stigmata and bases of wings, Brauer determined as *Calliphora aureopunctata* Macquart; Hutton includes this species as a synonym of *Calliphora icela* Walker. An examination of Walker's types of *hortona* and *icela* shows that the two species are identical, and that both are the species named by Brauer *aureopunctata*. I was unable to find any types or named specimens of either of Macquart's species at Paris, but from his descriptions there seems little doubt that the above determinations of Brauer are correct.

In the collection at Vienna I also noted a specimen labeled *rufifacies* Guerin-Meneville det. Loew; it is *Chrysomyia albiceps* var. *putoria*, referred to above.

BUDAPEST

The National Hungarian Museum at Budapest contains many important types, particularly those of Stein's Anthomyiinæ. It also contains the types of Mik's Palæarctic species; some of those of Frauenfeld, the collector of the Novara Reise Diptera; Pokarnz's Alpine Anthomyiinæ, Acroceridæ, and Syrphidæ; some Calliphorinæ named by Hough; and many types of the late Doctor Kertesz, the well-known author of the catalogue of the Diptera of the World. Doctor Kertesz (since deceased) was on his holiday at the time of my visit, but Doctor Csiki spent much time in searching through the collections for the specimens I wished to see. The types of *Musca aethiops* Stein and *Musca dasyops* Stein I heard afterward had not been returned from Treptow where the late Doctor Stein had them at the time of his death. Doctor Kertesz kindly sent them to me shortly before his death as well as many specimens of *Musca* determined by Stein. When I was at Budapest I took the opportunity of examining Professor Hovarth's collection of Cimicidæ and Polyctenidæ. I wish to take this opportunity of thanking both Doctor Hovarth and Doctor Csiki for all the trouble they took in showing me so much of interest.

TURIN

After leaving Budapest, I went to Turin and spent a week with Professor Bezzi examining his types and specimens and working

through all the important species with him. Professor Bezzi has probably the richest private collection of Diptera, and his library is a very complete one. I wish to take this opportunity of expressing my very great indebtedness to Professor Bezzi for placing at my disposal not only his specimens and library, but also his unique knowledge of the Diptera.

I spent a week in Paris examining Macquart's collection in the Entomological Department of the Natural History Museum as well as the collection of testaceous Calliphorinæ used by Surcouf in the preparation of his recent Revision des Muscidae Testaceae. I wish to thank Mons. Seguy for the great trouble he took in searching out this material for me.

I also spent a day with Doctor Villeneuve at Rambouillet and examined his types as well as those of the Calliphorinæ of Wiedemann and Macquart which he has with him at present. It is necessary to note that none of Macquart's types is in a good state of preservation, and I could not find any of the types of Guerin-Meneville.

On my way back to Edinburgh I spent some time in London reëxamining all the types of Walker, as well as those of Bigot, particularly his Calliphorinæ, which Mr. Collin very kindly lent me for study.

The following is a list of the forty-five species of the genus *Musca* known to me at present, with synonyms and notes on some of the species. The types of the species marked with an asterisk have been examined.

Musca domestica Linnæus.

*Musca corvina* Fabricius.
*Musca ludifica* Fabricius.
*Musca umbraculata* Fabricius.
*? Musca aurifacies* Robineau-Desvoidy.
*? Musca riparia* Robineau-Desvoidy.
*? Musca campestris* Robineau-Desvoidy.
*? Musca stomoxidea* Robineau-Desvoidy.
*? Musca campicola* Robineau-Desvoidy.
*? Musca vagatoria* Robineau-Desvoidy.
*? Musca hottentota* Robineau-Desvoidy.
*? Musca vicina* Robineau-Desvoidy (nec Macquart).
*? Musca rivulans* Robineau-Desvoidy.
*? Musca pellucens* Meigen.
*? Musca frontalis* Rondani.
*Musca minor* Macquart.*
*Musca australis* Macquart.*
*? Musca lateralis* Macquart.
*? Musca chiliensis* Macquart.

*Musca vicaria* Walker.*
*Musca antiquissima* Walker.*
*Musca calleva* Walker.*
*Musca pampasiana* Bigot.*

**Musca vicina** Macquart (nec Robineau-Desvoidy).

*Musca flavinervis* Thomson.*
*Musca flavifacies* Bigot.*
*Musca flavipennis* Bigot.*
*? Musca divaricata* Awati.
*? Musca analis* Macquart.

**Musca nebulo** Fabricius.

*Musca determinata* Walker * (nec Patton).
*? Musca multispina* Awati.

**Musca yerburyi** Patton.*

*Musca incerta* Patton * (nec Walker).

**Musca sorbens** Wiedemann.*

*Musca humilis* Wiedemann.*
*Musca spectanda* Wiedemann.*
*Musca latifrons* Wiedemann.*
*Musca mediana* Wiedemann.*
*Musca angustifrons* Thomson.*
*Musca bivittata* Thomson.*
*Musca sordissima* Walker.*
*Musca euteniata* Bigot.*
*Musca scapularis* Rondani.
*Musca dichotoma* Bezzi.*
*Musca biseta* Hough.*
*Musca conducens* Patton (nec Walker).

**Musca vetustissima** Walker.*

*Musca pumilla* Patton (nec Macquart).
*Musca minor* Patton (nec Macquart).
*Musca humilis* auctores (nec Wiedemann).
*Musca corvina* Froggatt (nec Fabricius).
*Musca niveisquama* Thomson.*

**Musca conducens** Walker.*

*Musca praecox* Walker.*
*Musca humilis* Patton (nec Wiedemann).
*Pristirhynchomyia lineata* Brunetti.

**Musca tempestiva** Fallen.

*? Musca cuprea* Macquart.
*? Musca nana* Meigen.

**Musca gymnosomea** Rondani.

**Musca tempestatum** Bezzi.*

As I have not seen a long series of *Musca gymnosomea* Rondani and *M. tempestatum* Bezzi I am not able to come to a final conclusion regarding their identity. As a result of the examination of a few specimens of *M. gymnosomea* kindly given me by Professor Bezzi I believe it is distinct from *M. tempestatum*. The two species are small flies with two broad black thoracic stripes. The eyes of the male *tempestatum* are closely approximated, the thorax and abdomen are olive green, and the latter has no silvery patches; the first tergite is black; the second is olive green with a broad black median stripe which extends along the upper border of the tergite, and a narrow black posterior band; the third and fourth tergites are mainly olive green; the sternites are dark gray.

**Musca fasciata** Stein.*

**Musca vitripennis** Meigen.

*Musca osiris* Wiedemann.*
*? Musca sugillatrix* Robineau-Desvoidy.
*? Musca phasiaeformis* Meigen.

**Musca lucidula** Loew.*

**Musca interrupta** Walker.*

*Musca lasiopthalma* Thomson.*

**Musca lucens** Villeneuve.*

**Musca villeneuvei** Patton.*

**Musca albina** Wiedemann.*

*Musca speculifera* Bezzi.*
*Musca beckeri* Schnabl.

**Musca albomaculata** Macquart.*

*Musca dorsomaculata* Macquart.*
*Musca rufiventris* Macquart.*

I am not sure of the identity of this small species from Mauritius Island. I have examined the types and note that in the male the eyes are closely approximated and there are two broad black thoracic stripes; in the female there are four stripes. It may prove eventually to be identical with *M. fasciata* Stein from the Seychelles. I would be glad to have specimens of this species from Mauritius, and hope that those who have an opportunity of collecting fresh examples will do so; it is probably a hæmatophagous fly and would be found around animals in the field.

**Musca pulla** Bezzi.*

*Musca craggi* Patton.*

**Musca xanthomelas** Wiedemann.*

*Musca convexifrons* auctores (nec Thomson).
*Musca albomaculata* Villeneuve (nec Macquart).
*Musca dorsomaculata* Villeneuve (nec Macquart).

**Musca ventrosa** Wiedemann.*

*Musca xanthomela* Walker.*
*Musca nigrithorax* Stein.*
*Musca pungoana* Karsch.*
*? Musca kasauleensis* Awati.

**Musca pattoni** Austen.*

*? Musca spinosa* Awati.

**Musca spinohumera** Awati.*

**Musca gibsoni** Patton and Cragg.*

*Musca latiparafrons* Awati.*

**Musca prashadi** Patton.*

**Musca bezzi** Patton and Cragg.*

**Musca mesopotamiensis** Patton.*

**Musca illingworthi** Patton.*

*? Musca lusoria* Stein (nec Wiedemann).

**Musca bakeri** Patton.*

**Musca hervei** Villeneuve.*

**Musca terrae-reginae** Johnston and Bancroft.*

**Musca hilli** Johnston and Bancroft.*

**Musca convexifrons** Thomson.*

*Musca australis* auctores (nec Macquart; nec Boisduval).
*Musca fergusoni* Johnston and Bancroft.
*Musca lusoria* Bezzi (nec Wiedemann).

**Musca lusoria** Wiedemann.*

**Musca dasyops** Stein.*

**Musca alpesa** Walker.*

*Musca spectanda* auctores (nec Wiedemann).

**Musca gabonensis** Macquart.*

*Musca aethiops* Stein.*
*Musca congolensis* Villeneuve.*

The type, a male, of *Musca aethiops* Stein is identical with the type male of *gabonensis* Macquart in Bigot's collection. The species *M. congolensis* Villeneuve is also this species.

**Musca natalensis** Villeneuve.*

**Musca autumnalis** De Geer.

*Musca corvina* auctores (nec Fabricius).
*Musca ludifica* auctores (nec Fabricius).

Among the specimens sent me from the Budapest Museum, I find that Stein has confused under the name *lusoria* three distinct species; namely, the true *lusoria* Wiedemann, *autumnalis* De Geer, and *alpesa* Walker. One male from Abyssinia labeled *corvina* Fabricius—by which Stein means *autumnalis* De Geer—is not that species, but is the typical *lusoria* Wiedemann. *Musca autumnalis* never has a row of small bristles along the ventral surface of vein $R_{4+5}$ extending beyond the radio-medial cross vein, but *lusoria* always has. Among the specimens labeled *lusoria* by Stein there are a male and a female of *Musca alpesa* Walker from Scharati and Arusha. In the male of this species there are two broad black thoracic stripes, but in the female they are usually divided into four in front of the suture; sometimes behind the suture the two stripes are divided by a very narrow gray line, but they are never seen as four widely separated black stripes as in *lusoria*. I have seen this species from many localities in Africa; it is only found on animals and in their neighborhood. It is probably oviparous. It would be interesting to know if it has a white puparium.

**Musca larvipara** Schnabl and Dziedzicki.

*Musca corvina vivipara* Portschinsky.

**Musca planiceps** Wiedemann.*

*Musca cingalaisina* Bigot.*
*Musca pollinosa* Stein.*
*Musca indica* Awati.

**Musca senior-whitei** Patton.*

**Musca inferior** Stein.*

*Philaematomyia gurneyi* Patton and Cragg.*
*Ptilolepis inferior* Stein.

**Musca fletcheri** Patton and Senior-White.*

**Musca crassirostris** Stein.

*Musca modesta* de Meijere.
*Philaematomyia insignis* Austen.*

Professor de Meijere tells me that his *Musca modesta* is identical with *M. crassirostris* Stein.

The above is a complete list of the species of *Musca* as known to me at present. As I have now studied the existing types of all the species the majority of the names are final; further study of a few species will be necessary before I can be certain of their identity; this will only be possible when fresh material is available.

# THE GENUS ANDES STÅL (CIXIIDÆ: HOMOPTERA)

By F. Muir

*Of the Hawaiian Sugar Planters' Experiment Station, Honolulu*

TWO PLATES

## Genus ANDES Stål

*Andes* Stål, Hem. Afr. 4 (1866) 166, no species mentioned; Oefv. Vet.-Ak. Forh. 7 (1871) 747, *undulatus* Stål described in *Andes*. *Leirioessa* Kirkaldy, Hawaiian Sugar Planters' Exp. Sta. Ent. Bull. 3 (1907) 112, pl. 8, figs. 19–21. Type *L. tortricomorpha* Kirkaldy.

The genus *Andes* was first described by Stål in 1866, but no species was consigned to it until 1871 when *undulatus* was described in that genus. Hence, the genus must date from the last-named year. It stood with the single species until 1923, when I described *Andes oldi*.[1] The present paper lists forty-eight species, including *A. oldi*, which I consider as belonging to the genus; thirty-two of these species are described as new.

The type material of *A. undulatus* Stål in the Stockholm Museum consists of two female specimens which Dr. E. Bergroth kindly compared with specimens from the Philippines, and which I have subsequently examined. It is, therefore, fairly certain that the identification of this species and the generic characters based upon it are correct. *Leirioessa tortricomorpha* Kirkaldy is congeneric with the type of *Andes*. The genus *Cotyleceps* Uhler into which Uhler placed *marmorata* Uhler I consider to be the same as *Pintalia* Stål, which differs considerably from *Andes*.

The abdomen is laterally compressed and the tegmina are large and tectiform, the apical margin wide and rounded, and when at rest they meet. The Sc, R, and M arise separately from the basal cell or from a point thereon, and do not form a stalk. Sc has two branches distad of the stigma and R has three. Mf is about level with the node and M has five apical veins, 1, 1a, 2, 3, 4. Cu forks about one-third from apex of clavus and Cu$_{1a}$ sometimes has a second branch (*undulatus*). The clavus enters the hind margin before apex of clavus. There is no costal area.

[1] Ann. & Mag. Nat. Hist. IX 11 (1923) 553.

This tegmen is the most generalized of the Cixiinæ. In profile the vertex and frons form a curve, except in a few species where the junction is slightly angular and slightly produced; vertex longer than broad, base considerably wider than apex and arcuately and deeply excavate; apex separated from frons by a small carina and there is another small, transverse carina slightly basad of this, thus forming a small fossette at apex of vertex; lateral carinæ deep. Frons long and narrow, base narrow, then gradually widening to beyond middle, then narrowing, apex wider than base, lateral carinæ deep, a median carina on apical portion of frons, median ocellus distinct. Clypeus long, narrow, tricarinate, the lateral carinæ continuous with carinæ of frons. Pronotum short, the lateral carinæ following the outline of the back of eyes and not reaching hind margin. Antennæ small, first segment very short, second segment about as long as wide, in a few species a little longer. Mesonotum tricarinate, slightly compressed laterally. Front coxæ with outer margin straight, subparallel with inner margin, not produced. Hind tibiæ unarmed or with very small spines. Pygofer of female small, as wide as long or longer than wide, bearing wax-secreting glands. Ovipositor complete, large, standing at nearly right angle to pygofer, generally slightly curved dorsad; anal segment fairly small. Male pygofer laterally compressed, medioventral process present, conical or angular in outline, lateral margins slightly curved or angular, symmetrical. Anal segment medium to large, often asymmetrical, anus in apical half. Ædeagus complex, the periandrium large, generally tubular with various processes, one of which is constant in a number of species, but of various size and shape, and is called the cucullus; penis generally small and membranous with or without a flagellum or virga. There is a strongly chitinous tube, the apodeme of the penis, from the base of the penis which passes through the periandrium and is attached to the apodeme which connects the genital styles. The ejaculatory duct passes through this apodeme and joins the base of the penis. Working with dried specimens only, it was not possible to be sure whether the ejaculatory duct opens on the flagellum, when one is present, or on the membranous process referred to as the penis (Plate 1, fig. 18).

The species examined are all very uniform in structure, and many of them are so in color design, so that, apart from the male genitalia, it is difficult to distinguish some of the species. Though a few species are distinctly colored, most of them have a common design which, for convenience, has been figured and

some of the marks named (Plate 2, fig. 28). The work on the male genitalia is of great interest as it shows what profound differences exist therein, in spite of the similar external appearances.

The types of new species have been deposited in the collection of the Hawaiian Sugar Planters' Experiment Station and cotypes, when present, in Prof. C. F. Baker's collection.

Measurements are from apex of head to anus, and from base to apex of one tegmen.

**Andes simplex** sp. nov. Plate 1, fig. 1.

*Male.*—Length, 2.7 millimeters; tegmen, 4.3 Head, pronotum, legs, and abdomen light brown; frons darker in the middle, a few darker minute spots on genæ; mesonotum darker. Tegmina hyaline with brown markings, the basal mark from base of tegmen along suture, extending to cubitus and first anal and not reaching to apex of clavus; the subcostal mark extends along the costa from stigma halfway to base, extending across to apex of basal mark where it narrows; a small light spot on costa in middle of subbasal mark, the anterior, basal, and distal margins of subbasal mark darker than the middle; the median mark forming a small line between R and $M_{3-4}$; the apical cells and extending nearly to median mark fuscous brown, darkest over R apical cells and lightest in middle of Ms; apical cross veins light. Granules small, numerous, brown. Wings light fuscous with brown veins.

Lateral margins of pygofer slightly rounded, entire. Anal segment fairly long, apex forming two small lobes. Genital styles in lateral view subangular in middle, the apex slightly produced. Ædeagus simple, periandrium subtubular, fairly well chitinized, with a spiral constriction in the middle; the penis consists of the membranous process and a long flagellum, the former slightly longer than half the periandrium and slightly chitinized at base, the latter longer than the periandrium and in the specimens dissected coiled around it.

*Female.*—Length, 3.8 millimeters; tegmen, 5. Similar in build and color to the male but slightly darker.

BORNEO, Sandakan (*Baker*), one male and one female.

**Andes decoloratus** sp. nov. Plate 1, figs. 2, 3, and 4.

*Male.*—Length, 3.5 millimeters; tegmen, 5.5. Light brown, darker over mesonotum. Tegmina light brown with very faint markings; the basal mark practically absent; the subbasal re-

duced to two faint, wavy lines from costa to suture near apex, apical cells slightly fuscous, slightly darker at apex of stigma and apices of apical cells; veins same color as membrane with numerous small, brown granules; stigma brown. Wings slightly fuscous with brown veins.

Lateral margins of pygofer roundly produced, no distinct anal angle. Periandrium tubular, simple, the sides membranous, a small, curved spine at base and two others at apex; penis consisting of a small membranous process with a small, curved virga attached to it. Anal segment fairly large, symmetrical, apex rounded. Genital styles in full view flat, basal two-thirds nearly straight, apical third curved outward, subequal in width to the angle, then narrowed to apex; in lateral view basal two-thirds curved, apical third nearly at right angle to base and narrowed to apex, giving it the appearance of the head and neck of a bird.

*Female.*—Length, 3.5 millimeters; tegmen, 6. Ovipositor about twice the length of pygofer. Much darker and more definitely marked than male. Basal mark extending over cell between cubitus and suture as far as middle, then extending over clavus to hind margin; subbasal mark extending from middle of costa to the apical portion of basal mark, a small clear spot on costal in middle of mark; stigma dark brown; apical cells fuscous, darkest over apical Rs, a small dark spot in apical $M_1$, $M_{1a}$, and another over the $Cu_1$, $Cu_{1a}$ cross veins; veins same color as membrane, granules small, brown, numerous, apical veins with lighter spots; apical cross veins light. Wings slightly fuscous, veins brown.

WEST BORNEO, Mowong (*Muir*), one male and two females, September, 1907.

**Andes trispinosus** sp. nov. Plate 1, figs. 5 and 6.

*Male.*—Length, 3.5 millimeters; tegmen, 5.4. In color lighter than female, the pattern on tegmen being greatly faded, so that only the darker edges of the subbasal mark, a mark at apex of clavus, and another at apex of R alone remain distinct.

Lateral margins of pygofer slightly arcuate, entire, anal emargination large and anal angle nearly a right angle. Anal segment long, in dorsal view subparallel-sided to near the rounded apex, anus about middle. Genital styles large, the shape best understood by the figure. Æedeagus with the periandrium tubular, on the right side a small, curved spine arises from near the middle and a larger spine near the apex, from the left side three

large spines with a common base arise at apex; the penis is small, membranous, with a small spine or virga.

*Female.*—Length, 4 millimeters; tegmen, 5.7. Ovipositor about one and one-half times the length of pygofer, slightly curved; pygofer about as long as broad.

Dark brown, pleura and hind margins of abdominal sternites light. Tegmina with brown markings and hyaline patches; the basal mark covering the Cu and greater part of clavus and joining the subbasal mark, which is produced distally into a point between M and Cu; the median mark is distinct and joins the apical over Cu, apical mark with a curved hyaline mark in apical cells from R to $M_3$ and a small mark in Sc and R apical cells; veins same color as membrane with numerous small, dark granules; cross veins mostly lighter in dark areas. Wings hyaline, slightly tinged with brown, veins darker brown.

JAVA, Buitenzorg, one male; Roban, one female; Tjibodas, one female (*Muir*).

**Andes serratus** sp. nov. Plate 1, figs. 7 and 8.

*Male.*—Length, 3.8 millimeters; tegmen, 5.5. The genitalia are near to *A. trispinosus* but are quite distinct and differ as follows: The lateral margins of pygofer are slightly sinuate and the anal angle is more prominent; the anal segment is shorter with the anus in middle; the genital styles are smaller and differ considerably in outline; the three spines of *trispinosus* form one process with three spines, the apical one with three or four minute teeth on its upper margin; the penis is larger and the flagellum longer; the spine on the right of apex has two prongs; the periandrium is tubular and has a curved spine on right side near middle.

Light brown, slightly darker on frons and between carinæ of mesonotum. Tegmina hyaline, slightly tinged with brown or stramineous, the design faded so that two small brown marks in costal cell, one or two spots in clavus, and a mark slightly distad of apex of costa are all that remain; veins light with numerous small, dark brown granules. Wings hyaline, slightly fuscous with brown veins.

*Female.*—Length, 3.4 millimeters; tegmen, 5.7. Ovipositor about twice the length of pygofer. From the middle of the hind margin of the pregenital plate (seventh sternite) projects a single small spine.

Dark brown; lighter over lateral portions of pronotum, abdominal pleura, and hind margins of sternites; a darker band on

front femora. The basal mark on tegmina faint; subbasal mark distinct, stretching from the middle of costa to the apical portion of clavus, its distal margin curved and undulating; median mark reduced to a very small mark near fork of $M_{1 and 2}$; apical cells fuscous with a lighter mark over R to $M_3$; veins same color as membrane with numerous small, brown granules. Wings hyaline, fuscous brown with darker veins.

JAVA, Buitenzorg, one male; Doro, one female (*Muir*).

**Andes tridentatus** sp. nov. Plate 1, fig. 9.

*Male.*—Length, 3.4 millimeters; tegmen, 5.5. In lateral view lateral margins of pygofer widely subangular, the anal angle distinct, nearly a right angle; anal segment fairly large, anus slightly distad of middle, apex rounded, entire; genital styles widest on apical half, curved, sublanceolate, apex pointed; periandrium tubular, fairly thin, on the right side a short, stout spine about middle and three spines arising from the same base near apex; from the ventral aspect of apex arises a stout process pointing basad about two-thirds the length of periandrium with its apex produced into three stout spines; penis membranous, small, with a long flagellum.

Brown, two or three marks on lateral carinæ of face darker, femora and bases of tibiæ darker. Tegmina dark with distinct design, subbasal mark distinct, from middle of costa to apical portion of cubitus, distal border produced angularly between Cu and M, margins of mark darker than middle, a dark mark at apex of costal cell and over $Cu_{1a}$ beyond clavus; no distinct median mark; apical cells dark brown; veins lighter than membrane with many small, dark granules, apical cross veins light. Wings fuscous brown with darker veins.

*Female.*—Length, 5.3 millimeters; tegmen, 5.7. Slightly darker than male; ovipositor about one and one-half times the length of pygofer.

BORNEO, Sandakan (*Baker*), one male and one female.

**Andes quadrilaminatus** sp. nov. Plate 1, figs. 10 and 11.

*Male.*—Length, 3.5 millimeters; tegmen, 5.5. No distinct anal angle on pygofer, sides arcuate; anal segment fairly long, anus about two-thirds from base, sides subparallel to anus beyond which they converge to apex which is pointed and curved ventrad; genital styles narrow, slightly curved, subparallel-sided, apex subtruncate. A small flange projects on right side of apex of periandrium which is produced into two small spines apically; from apex projects a large, narrow, thin process

like a knife blade with four small, curved teeth along its base; slightly basad arise three smaller processes, two projecting to the left and one projecting basad; penis tubular, membranous, without a flagellum.

Light brown; middle of frons and clypeus, middle of vertex, three marks in front of eyes, and front femora darker brown, lateral portion of pronotum lighter. Tegmina light brown or stramineous, design obscure, the subbasal mark curved from middle of costa to apical half of clavus and only distinguished by the dark basal and apical margins; apical cells light fuscous brown, veins lighter with numerous small, light, inconspicuous granules bearing light macrotrichia. Wings light fuscous with dark veins.

BORNEO, Sandakan (*Baker*), one male.

**Andes spinosus** sp. nov. Plate 1, fig. 12.

*Male.*—Length, 4 millimeters; tegmen, 5. Brown; lateral carinæ of frons spotted with darker spots, the sense rings on antennæ dark, middle of pronotum darker than sides, where there are some minute dark spots, middle of mesonotum darker than sides; femora dark brown. Tegmina hyaline, stramineous or light brown; basal mark very small, obscure; subbasal mark forming two irregular lines, the basal one from middle of costa to near apical portion of clavus and the distal one from base of stigma to apex of clavus; apical cells fuscous with two lighter areas, one over apical Sc, the other from apical Rs to apical Cu, wider between $M_{2 \text{ and } 3}$; veins same color as membrane with numerous small, brown granules. Wings fuscous with dark veins.

Lateral margins of pygofer roundly produced; anal segment fairly large, anus slightly distad of middle, sides in dorsal view subparallel to anus, then converging to a pointed apex; genital styles with basal half of outer margin concave, apical half nearly straight, inner margin sinuous, apex rounded; periandrium narrow at base, widest at apex, slightly twisted; there are four long, thin, curved processes all pointing basad and nearly as long as the periandrium, all of which appear to arise from the apex of the periandrium; the penis forms a strong spine at base with a small membranous appendage.

BORNEO, Sandakan (*Baker*), one male.

**Andes fictus** sp. nov. Plate 1, fig. 13.

*Male.*—Length, 4 millimeters; tegmen, 5.4. Clypeus, frons, vertex, genæ, mesonotum, and legs light brown, abdomen darker

brown, carinæ of frons and pronotum nearly white or slightly stramineous. Tegmina hyaline with light brown or stramineous design; basal mark light, running from base of clavus to near apex where there is a fuscous line or border; subbasal mark light with a fuscous margin, on the costa a small hyaline mark in middle; apical marks very faint; veins same color as membrane, granules minute, light brown. Wings hyaline, slightly opaque with waxy secretion, veins light brown.

Lateral margins of pygofer subangular in middle. Anal segment large, asymmetrical, the right lateral margin produced more than the left with a rounded production on apical half, anus near middle, apex bluntly pointed. In lateral view genital styles concave on outer margin, convex on inner, subequal in width or slightly wider at apex. Periandrium tubular with six curved spines of different sizes on apical half, the cucullus in the form of a large, flattened spine reaching nearly to base of periandrium; penis small, membranous, flagellum short.

MINDANAO, Butuan (*Baker*), one male.

**Andes maculifrons** sp. nov. Plate 1, fig. 14.

*Male.*—Length, 3.5 millimeters; tegmen, 5.5. In general build and coloration this species is like *A. spinosus*, but the genitalia are quite different. The anal segment is larger and more rounded at apex; the genital styles are smaller and the apical half of outer margin is more sinuous. The periandrium is long, slightly flattened laterally, with two longitudinal carinæ, the left one produced into a large cucullus on apical half which is curved to left and triangular, a small spine rises from the left side near apex; the penis is large, chitinous, produced at apex to a slender spine, with a long, straight flagellum or virga arising from the base.

JAVA, Pekalongan (*Muir*), one male, 1907.

**Andes ornatus** sp. nov. Plate 1, figs. 15, 16, 17, and 18.

*Male.*—Length, 3.2 millimeters; tegmen, 5. Light brown, darker in middle of mesonotum and pronotum, and on vertex and frons between carinæ, lateral carina light with a few darker marks; legs and abdomen light. Tegmina distinctly colored; basal mark distinct, running from base between Cu and first claval and joining subbasal mark which is also distinct, and running from middle of costa to apex of clavus, a small hyaline mark in middle of band in costal cell, the margins of band darker than the rest. The median mark is a line from base of stigma

to $M_{1,2}f$ and on to middle of $M_{3,4}$; apical cells fuscous with the two characteristic hyaline marks running together.

Lateral margins of pygofer rounded; anal segment not very long, broad, anus slightly distad of middle where the segment is widest, apex round; genital styles narrow, flat, angular in middle, apex pointed. Periandrium stout, strong, a short spine on dorsal and a thinner one on ventral aspect about middle; from the ventral aspect of apex arises a thin, long keel and from the left side of the base of this keel arises a flat process, broad at base and tapering to an acute apex.

SINGAPORE (*Baker*), one male, the type. BORNEO, Pontianak (*Muir*), one male.

**Andes pulchellus** sp. nov. Plate 1, fig. 19.

*Male.*—Length, 3.4 millimeters; tegmen, 5. Head dark brown, four light marks on lateral carinæ of vertex and base of frons, a light mark at base of antenna to lateral carina of frons; pronotum and mesonotum dark brown, the hind margin and the lateral portion of pronotum behind the lateral carinæ light; coxæ, femora, and pleura brown, tibiæ and tarsi lighter, abdomen dark brown; pleura and genitalia lighter. Anterior half and basal third of tegmen brown, posterior half from fork of Cu milky white, sending six white radiating marks to costa, the first from near base of costa to base of M, a second incomplete mark from C to Sc, the third from apical third of C to Mf, the fourth from stigma to $M_{1,2}f$, the fifth from apex of Sc to R-M apical cross vein, the sixth from apex of R across apical cells to $M_4$, two small dark marks in the apical portion of fourth and fifth apical M cells, a small brown mark on margin at apex of clavus, first claval vein white, veins same color as membrane, granules very small and inconspicuous. Wings milky white with white veins.

Lateral margins of pygofer slightly curved, continuous with anal emargination, no anal angle; anal segment fairly large, anus about middle where it is slightly widest, apex rounded. Genital styles curved, apex slightly rounded. Periandrium fairly long, tubular, with a flattened spine at apex on left side pointing basad, forming a narrow, pointed cucullus. Penis small, membranous, flagellum slender, fairly long.

*Female.*—Length, 3.5 millimeters; tegmen, 5.5. Ovipositor considerably longer than pygofer, curved; similar in color to male.

WEST BORNEO, Mowong (*Muir*), three males and two females, September, 1907.

**Andes brunneus** sp. nov. Plate 1, fig. 20.

*Male.*—Length, 3 millimeters; tegmen, 5. Head dark brown, labium lighter, middle and anterior portion of pronotum dark brown, lighter behind lateral carinæ, legs light brown, abdomen darker brown with lighter posterior margins.

Basal mark from base to apex of clavus covering Cu to first claval vein; subbasal from middle of costa where it is wide to fork of Cu where the distal margin projects along $Cu_1$, then to apex of clavus where it joins basal mark, darkest along margins, a few dark dots in clavus and in space between basal and subbasal marks, median mark small with a few dark spots near it; apical cells slightly fuscous with the subhyaline marks extensive but indistinct; apical cross veins light, the other veins about the same color as membrane, granules very small and inconspicuous.

Lateral margins of pygofer rounded, continuous with anal emargination; anal segment fairly large, anus in apical third, widest slightly basad of anus, sides slightly arcuate, apex rounded. Genital styles angulate slightly distad of middle, apex slightly widened, subtruncate. Periandrium fairly thin, in lateral view dorsal margin slightly sinuous, ventral margin more distinctly sinuous, cucullus small, covering the apical third of periandrium; penis small, membranous; flagellum fairly large.

BORNEO, Sandakan (*Baker*), three males.

**Andes furcatus** sp. nov. Plate 2, fig. 1.

*Male.*—Length, 3 millimeters; tegmen, 4.6. Light brown. Tegmina hyaline with the markings faint and indistinct; the subbasal mark from the middle of costa to beyond the fork of Cu, then to fork of claval veins; apical cells faintly fuscous, a few irregular and faint spots over median area; veins slightly lighter than membrane; wings fuscous with brown veins.

Lateral margins of pygofer slightly arcuate, anal angle very slight; anal segment with anus on third fourth, where it is widest, apex round; genital styles widest at apex which is slightly rounded, curved in middle. Periandrium tubular, slightly twisted, the cucullus median size, arising from right side of apex, widest at base, gradually narrowing to apex where it is produced into two small processes; penis fairly large, membranous; flagellum slightly longer than periandrium.

MINDANAO, Iligan (*Baker*), one male.

**Andes parvus** sp. nov. Plate 2, fig. 2.

*Male.*—Length, 2.5 millimeters; tegmen, 3.8. Brown; mesonotum slightly darker than head and pronotum. The pattern

on tegmen obscure, the apical two-thirds being more or less infuscate with some darker marks on Cu, veins the same color as membrane, granules brown, those on basal half more distinct and larger than those on apical half. Wings fuscous with darker veins.

Lateral margins of pygofer slightly arcuate, continuous with anal emargination, no anal angle. The anal segment asymmetrical, the right side on apical half being produced considerably more than the left, anus slightly distad of middle, apex round. Genital styles angular in middle, apex subtruncate, subequal in width throughout. Periandrium flattened laterally, in lateral view dorsal margin concavely curved, ventral margin more strongly convexly curved, widest across middle; cucullus median size, the shape best seen in the figure; penis small, membranous, flagellum fairly long.

BORNEO, Sandakan (*Baker*), one male.

**Andes stramineus** sp. nov. Plate 2, fig. 3.

*Male.*—Length, 3.3 millimeters; tegmen, 5. Stramineous; lateral portions of pronotum light; front and middle femora fuscous. Tegmina hyaline with stramineous marks, the basal mark from base to apex of clavus extending over the fork of Cu where it is margined with fuscous; the subbasal mark broken up into three spots with fuscous borders, two spots on the costa and one across middle of R and M stalk, the apical half of tegmen light stramineous with some irregular and obscure hyaline spots; veins same color as membrane with very minute and inconspicuous granules the same color as veins. Wings hyaline, slightly obscure with waxy secretion, veins light.

Lateral margins of pygofer slightly arcuate, continuous with anal emargination, no anal angles, anal segment with anus distad of middle, apex rounded. Genital styles bent at right angle in middle, apex slightly rounded, a slight projection on inner margin near base. Periandrium flattened laterally, the ventral margin projecting considerably, more so on basal half where it forms two projections, cucullus fairly large, the apex wide and produced into two short, rounded processes; penis small, membranous, flagellum a little longer than periandrium.

BORNEO, Mowong (*Muir*), one male, September, 1907.

**Andes unifasciatus** sp. nov. Plate 2, fig. 4.

*Male.*—Length, 3 millimeters; tegmen, 4.6. Frons and clypeus between lateral carinæ and vertex dark brown, lateral carinæ of frons and clypeus light brown; pronotum in the

middle and anterior to lateral carinæ dark brown, posterior to lateral carinæ white or yellowish; mesonotum dark brown; legs light brown. Tegmina hyaline, stramineous, subbasal mark represented by a thin line across tegmen from middle of costa to near apex of clavus, the line broken at suture; the median mark small, apical cells fuscous with the hyaline marks obscure, apical cross veins light, other veins same color as membrane, granules obscure, same color as veins. Wings fuscous with dark veins.

Anal angle of pygofer rounded, distinct, lateral margins slightly curved; in profile the lateral margin slightly sinuous with a slight round projection near apex, apex rounded, anus about one-third from apex. Genital styles angular in middle, apex slightly widened and slightly rounded. Periandrium flattened laterally especially on basal half which is produced ventrally into an angular process with the apex acute and curved to the right; cucullus fairly large, subtriangular, wide at base, curving to left; penis membranous, small; flagellum nearly as long as periandrium.

BASILAN (*Baker*), one male. There is one female from Dapitan, Mindanao, similar to this male but darker, which I place in the species but do not include in the type material as the male from that locality is possibly distinct.

**Andes dubiosus** sp. nov. Plate 2, figs. 5 and 6.

*Male.*—Length, 3 millimeters; tegmen, 4.5. In build and color this is similar to *A. unifasciatus* except that the subbasal mark is represented by two lines, one the distad and the other the basad margin of the mark.

No anal angle to pygofer, the lateral margins rounded. Anal segment fairly long and narrow, sides subparallel, anus about one-third from apex, apex slightly narrowed and truncate; genital styles subangular in middle of inner margin, outer margin concave, apex subtruncate. Periandrium long, produced into a process on left side as shown in figure, cucullus small, curved to left, on right produced into a large, flat, spinelike process; penis submembranous, fairly large, flagellum not so long as periandrium.

*Female.*—Length, 3.2 millimeters; tegmen, 4.7. In build and color similar to male but darker and the design on tegmina more distinct.

MINDANAO, Surigao (*Baker*), one male, type, and one female; Dapitan (*Baker*), two females.

**Andes pseudobrunneus sp. nov. Plate 2, fig. 7.**

*Male.*—Length, 3.5 millimeters; tegmen, 5.4. Brown; darker on sides of clypeus and on mesonotum, a dark band on front tibiæ. The basal mark light, running from along claval suture to apex of clavus; the subbasal mark forming a dark mark on claval cell with a light center and a dark mark at base of stigma; it is broken over median and covers fork of cubitus; apical cells fuscous with the hyaline mark through them; veins light, the granules minuté, and of the same color as the veins, cross veins and apical cross veins light with the bordering membrane mostly dark, a number of brown spots along R, M, C, and claval veins mostly basad of cross veins. Wings fuscous with darker veins.

Lateral margins of pygofer arcuate, continuous with anal emargination; anal segment fairly small, apex rounded; periandrium cylindrical, slightly twisted and enlarged on apical half; cucullus moderately small and obtusely pointed, penis comparatively large and studded with chitinous teeth, flagellum a little longer than periandrium.

*Female.*—Very much darker than male, the pattern on tegmina more distinct, and the subbasal mark not so distinctly broken in the middle. Anal segment longer than broad, the ovipositor double the length of pygofer or more.

MINDANAO, Zamboanga, one male and one female, the types; Iligan, one male; Surigao, Butuan, one female (*Baker*).

In color this comes close to *A. brunneus*, but in the ædeagus comes nearer to *A. furcatus*.

**Andes brunniceps sp. nov. Plate 2, fig. 8.**

*Male.*—Length, 3.6 millimeters; tegmen, 5.7. Head dark brown, antennæ, thorax, legs, and abdomen lighter brown, slightly darker in middle of pronotum and mesonotum, a small fuscous band on front femora. Tegmina light brown or stramineous, a few dark dots on veins representing the basal and apical margin of subbasal mark with a few other small marks on veins; median mark distinct between R and $M_{3+4}$, a dark mark across R apical cells and another at apex of $R_2$ and $M_1$ apical cells; veins same color as membrane, granules minute, same color as veins. Wings hyaline, slightly brownish, and opaque with waxy secretion, veins brown.

The genitalia are shown in the figure. The cucullus, in the shape of a large, flattened spine, reaches about one-third from

base of periandrium; penis membranous at base, more chitinous on apical portion which is flattened and serrated along edge.

MINDANAO, Kolambugan (*Baker*), one male.

**Andes undulatus** Stål. Plate 2, fig. 9.

*Andes undulatus* STÅL, Oefv. Vet. Ak. Forh. 7 (1871) 747.

*Male.*—The lateral margins of pygofer wide and subangular in middle. The anal segment moderate with the anus in apical third, apex round and slightly asymmetrical, the right side being slightly more produced than the left. Genital styles flat, narrow, angular in middle with a small projection on inner margin at the bend, apex rounded. Periandrium tubular, slightly bent, with a small, curved spine on left side near base; the cucullus fairly large, arising from the right side near apex and curving round to the left, the outer margin sinuous, produced to a fine point apically, penis small, membranous, flagellum long, slender.

**Andes marmoratus** (Uhler). Plate 2, figs. 10 and 11.

*Cotyleceps marmorata* UHLER, Proc. U. S. Nat. Mus. 19 (1896) 280.

In profile the head is more conical at junction of vertex and face than in *A. undulatus* Stål; R has four apical veins, M six, namely, 1, a, b, 2, 3, 4; the antennæ are a little longer than broad. Apart from these characters the species is quite typical of the genus.

The genus *Cotyleceps* Uhler, as I understand it, is the same as *Pintalia* Stål and differs considerably from *Andes*.

The genitalia can be best studied in the figures. The cucullus is large, attached to the right apical portion of the periandrium, and folds around to the left; the margin is irregular. When soaked in water the cucullus flattened out as in the figure, but I do not know if it has the power to do so when living. The penis is small and membranous with a long, curved flagellum. My specimens are from Okitsu, Japan (*Muir*), May, 1913.

**Andes usitatus** sp. nov. Plate 2, fig. 12.

*Male.*—Length, 3.4 millimeters; tegmen, 5.2. Brown, the outer portion of the pronotum posterior of the lateral carinæ, light, the lateral portions of mesonotum lighter than the middle. Markings on tegmina stramineous; the basal mark extends from base to near apex of clavus between first claval and Cu; the subbasal from the middle of costa to apex of basal mark where it projects angularly along Cu, on costa two fuscous spots, and a small one on the veins on basal margin; a dark line borders

the apical portion of basal mark and the angular portion of the subbasal; a small fuscous mark on costa near stigma; slightly stramineous over cross veins; median mark thin, faint; apical cells slightly stramineous with the typical markings a fuscous wedge-shaped mark through middle of R apical cells, faintly fuscous over apical portion of R and M apical cells. Veins same color as membrane, granules minute, same color as veins. Wings hyaline, slightly opaque with waxy secretion, veins brown.

Lateral margins of pygofer arcuate. Anal segment fairly large, asymmetrical, the right lateral margin on apical half produced much more than the left, apex rounded. Genital styles in lateral view subangular in middle, apex subtruncate, slightly expanded and oblique. Periandrium produced ventrally on basal half into two processes, the basal one like a curved flange and the apical one subconical; cucullus quadrate, reaching about the middle of periandrium; ædeagus membranous on basal half, more chitinous on apical half which is flat and slightly serrate on one edge; flagellum slightly longer than periandrium.

*Female.*—Length, 3.8 millimeters; tegmen, 6. Similar in color to the male, only darker, the design on the tegmen being more brown than stramineous.

MINDANAO, Butuan, two males and one female; Surigao, one male (*Baker*).

**Andes serrulatus sp. nov.** Plate 2, fig. 13.

*Male.*—Length, 3.8 millimeters; tegmen, 5.4. In general build and color this species is very like *A. furcatus*, which is similar to *A. brunneus* and *A. pseudobrunneus*, only much paler and the design is much more indistinct.

The genitalia are distinct from those in the species just mentioned and are nearer to *A. usitatus*. They can be best understood from the figure. The anal segment is asymmetrical, being produced on the right edge more than on the left. The periandrium is produced quadrately on basal half of ventral margin with a raised flange; the cucullus is in two parts, both quadrate and longer than broad, reaching basad more than half the length of periandrium; basal half of penis membranous, apical portion thinner, narrower, more heavily chitinized and serrated along its margins, more distinctly along one margin.

The female is darker and agrees with the female of *pseudobrunneus*, but the subbasal mark is a little wider and runs into the median design, and the light mark in costal cell between the

subbasal and the mark near stigma is more distinct. Ovipositor about double the length of pygofer.

LUZON, Mount Maquiling (*Baker*), two males; Los Baños (*Baker; Muir*), three females, September, 1915.

**Andes mindanaensis** sp. nov. Plate 2, fig. 14.

*Male.*—Length, 3.3 millimeters; tegmen, 4.8. Head dark brown with lighter carinæ; pronotum light brown, darker anterior to lateral carinæ; mesonotum dark brown in middle, light brown at sides, legs brown, abdomen brown. Tegmina light brown or dark stramineous, the subbasal mark represented by two thin, brown marks, curved, from costa to commissure, representing the distal and basal margins, a thin, fuscous line from apex of costa to hind margin across the cross veins, two small marks between R and $M_{1+2}$ and $M_{1+2}$ and $M_{3+4}$, costal cells fuscous, two darker marks, one from apex of stigma and the other from apex of Sc, meeting at apical cross vein between R and M and bordering apical cross veins to Cu, veins light, granules very minute, same color as veins.

Male genitalia figured. The periandrium is angularly produced on ventral portion of basal half; the cucullus reaches about halfway to base of periandrium; the penis is membranous with small chitinous teeth on apical portion.

*Female.*—Length, 4.4 millimeters; tegmen, 6. In build and color similar to male but darker and the design on tegmina is more distinct.

MINDANAO, Kolambugan, one male, type; Iligan, one male and three females; Butuan, one female (*Baker*).

**Andes angulatus** sp. nov. Plate 2, figs. 15 and 16.

*Male.*—Length, 3.3 millimeters; tegmen, 5. In profile the junction of vertex and frons angular or subconical in outline, and slightly produced; length of antennæ about twice the width. Otherwise as in *A. undulatus*.

Yellow or light brown, darker brown over vertex, frons, genæ before eyes, and a band on front tibiæ and femora. Tegmina hyaline with yellowish markings, the basal mark covering base of Cu and clavus except the first claval vein which is white; the subbasal mark is indefinite, sharply bordered on the basal margin by black which projects V-shaped on Cu, but on the apical margin not defined from the yellowish markings which cover apical and subapical cells, the centers of most of these cells being hyaline; a little black mark through apical R cells,

another through Cu fork and a few spots in Cu and last apical M cells; veins same color as membrane; granules minute, obscure. Wings hyaline with yellowish veins.

In lateral view pygofer without anal angle; anal segment large, slightly asymmetrical, the right side being produced slightly more than the left, apex emarginate, anus slightly distad of middle; genital styles in lateral view curved, outer margin concave, inner margin convex, slightly widest at apex which is oblique and subtruncate; periandrium best understood by a study of the figure, penis small, semimembranous, flagellum a little longer than periandrium and in the specimen examined curved round the middle of periandrium.

PENANG (*Baker*), one male.

**Andes indistinctus** sp. nov. Plate 2, figs. 17 and 18.

*Male.*—Length, 3.5 millimeters; tegmen, 5.4. R with four apical veins, otherwise as in *A. undulatus*.

Fairly uniformly brown, the extreme edges of the lateral carinæ of frons and vertex fuscous. Tegmina hyaline, very light brown, the subbasal mark represented by two irregular fuscous lines from middle of costa to apex of clavus, a small fuscous mark at base of stigma, apical cells slightly fuscous with an obscure design, veins light brown with a few light spots, granules minute, sparse, same color as veins. Wings light fuscous, veins brown.

Anal angle of pygofer distinct, subangular, ventrad of anal angles sides nearly straight. Anal segment median size, asymmetrical, the apical portion of the right margin produced into a triangular process with acute apex; anus in apical third. Genital styles in lateral view curved, apex slightly widest, subtruncate, outer margin concave, inner margin convex. Periandrium tubular, slightly sinuous, cucullus reaching halfway to base, curved around to left, apex produced into a stout, curved spine; penis small, membranous; flagellum about as long as periandrium.

BORNEO, Mowong (*Muir*), one male, September, 1907.

**Andes inaequalis** sp. nov. Plate 2, fig. 19.

*Male.*—Length, 3 millimeters; tegmen, 4.6. Similar in build to *A. undulatus* but R has four branches.

Light brown; tegmina hyaline, slightly fuscous, the subbasal mark represented by two marginal lines running from costa to apical portion of clavus, median mark forming two small, curved

lines between R, $M_{1+2}$, and $M_{3+4}$; slightly fuscous over cross veins, through the middle and at apex of apical cells; granules on veins minute, same color as veins. Wings hyaline, slightly fuscous, veins dark.

Lateral margins of pygofer slightly rounded. Anal segment fairly short, asymmetrical, the right margin on apical half being produced into a large angular projection much longer than the width at its base. Genital styles concave on outer margin, convex on inner or subangular about middle, apex broad, subtruncate. The periandrium is produced quadrangularly on basal half of ventral aspect, the dorsal margin rounded from base to middle and from middle to near apex; the cucullus is fairly large, arises from the right side of apical half, and curves to the left; penis membranous, flagellum longer than periandrium.

BORNEO, Sandakan (*Baker*), one male.

In general build and coloration this is very like *A. undulatus*, but the genitalia are distinct.

**Andes bakeri** sp. nov. Plate 2, fig. 20.

*Male.*—Length, 2.6 millimeters; tegmen, 4.3. In lateral view junction of frons and vertex angular, slightly produced. Light brown, darker over middle of pronotum and mesonotum, lateral portion of pronotum much lighter, nearly white. Tegmina hyaline, light brown, slightly darker between suture and first claval, nearly white between first and second claval veins. Wings slightly fuscous with slightly darker veins.

Lateral margins of pygofer rounded. Anal segment median size, anus in apical half, apex rounded. Genital styles in lateral view curved, outer margin concave, inner convex or with two slight angles, apex slightly expanded, subtruncate. Periandrium produced into two processes on ventral aspect, the basal one rounded with a minute process, the apical one angular, cucullus fairly large, reaching about one-third from base, curved to left, with the margin produced angularly. Penis small, membranous, flagellum a little longer than periandrium.

SINGAPORE (*Baker*), one male.

**Andes cucullatus** sp. nov. Plate 2, figs. 21 and 22.

*Male.*—Length, 4 millimeters; tegmen, 5.7. Stramineous; a small black mark on gena across ocellus, five small black spots on lateral carinæ of frons, and a small black mark at apex of frons. Tegmina hyaline, whitish, veins light stramineous with

minute brownish granules on basal half of tegmina; the subbasal mark represented by five or six small black marks on veins representing the basal margin, and five or six small dark marks on veins representing the apical margin. Wings hyaline, white with waxy secretion, veins stramineous.

The genitalia are remarkable for the great development of the cucullus which is attached to the periandrium from near apex to near base and curves to the left. The details are best understood by the figure.

*Female.*—Similar to male but the marks on tegmen distinct and slightly fuscous over middle and apical portion of tegmina.

SINGAPORE (*Baker*), one male and one female.

**Andes mitellatus** sp. nov. Plate 2, figs. 23 and 24.

*Male.*—Length, 3.7 millimeters; tegmen, 5.3. In build and color this species is similar to *A. cucullatus*, but there are some differences in the genitalia as will be seen from a comparison of the figures. The genital styles in full view are broader in the middle, and in profile longer over the apical portion distad of the angle; the cucullus is not quite so large and does not join the base of the periandrium in the same manner.

The female is darker, the middle of the mesonotum brown; the spots on the veins representing the margins of the subbasal mark are larger, and the apical and subapical cells slightly brownish.

Selangor, Federated Malay States (*Baker*), one male and three females.

**Andes insolitus** sp. nov. Plate 2, figs. 25 and 26.

*Male.*—Length, 3.4 millimeters; tegmen, 5. Stramineous; seven or eight small fuscous marks across the lateral carinæ of face, the lateral carinæ of vertex also slightly fuscous, a slight fuscous band at apex of front tibiæ. Tegmina hyaline, the pattern light stramineous, basal mark running from base to near apex of clavus, subbasal mark from middle of costa to apex of clavus, the apical and basal margin thinly margined with fuscous, a slight stramineous mark at apex of costal cell; median mark represented by two small fuscous dots near fork of $M_{1+2}$; apical cells very slightly fuscous with the normal design very faint; a small fuscous mark at apex of $Cu_{1b}$; veins same color as membrane or slightly stramineous, granules very minute, fuscous on basal half of tegmina but same color as veins on apical half. Wings hyaline, slightly white with waxy secretion, veins stramineous.

The genitalia are very distinct from those of any other species so far examined, especially the ædeagus. The margins of the anal emargination and the dorsal part of the lateral margins of the pygofer form a slight curve, the ventral portion of the lateral margins is slightly sinuous, and there is a slight angle at the junction of the two. Anal segment short, parallel-sided, apex rounded, anus on apical third. Genital styles large, in lateral view broad at the apex which is subtruncate, oblique, and slightly sinuous. The ædeagus is best understood from the figure; the periandrium is compressed laterally and thin, in lateral view roundly ovate, with the apical and ventral margins curved to the left; the penis is small and the flagellum considerably longer than the periandrium.

The female is similar to the male, only a little darker and the design on tegmen is more distinct.

SINGAPORE (*Baker*), three males and three females.

**Andes distinctus** sp. nov. Plate 2, fig. 27.

*Male.*—Length, 3.4 millimeters; tegmen, 5. Stramineous; a few darker marks on lateral carinæ of frons and vertex; mesonotum slightly darker than pronotum. Tegmina hyaline, design stramineous; basal mark running from base to near apex of clavus over Cu and suture, the apical margin bordered with fuscous and a small fuscous spot on Cu; subbasal mark fairly narrow with a V-shaped hyaline spot on costa and broken over Cu fork and M, basal and distal margin thinly bordered with fuscous, a small stramineous mark at apex of costal cell; median mark small, fuscous; apical cells faintly stramineous with the design very faint; veins same color as membrane, granules very small, brown. Wings hyaline, slightly opaque with waxy secretion, veins fuscous.

The genitalia are very distinct, the ædeagus being different from any other species so far examined. The lateral margins of pygofer rounded, no anal angles; anal segment medium size, apex rounded; genital styles in lateral view concave on outer margin, convex on inner, broadest at apex where they are angularly emarginate on outer half. Periandrium large, flattened laterally, thin, hatchet-shaped or subquadrate, longer than broad; on the right side from near base arises a subquadrate or hatchet-shaped process a little more than half the length of the periandrium, with a long, thin process near the base of its ventral edge; the large expanded portion of the periandrium could be considered as a cucullus; across the middle of its inner or right

side there is an angular flange, whose apex is produced into a large acutely angular process which curves over the base of the penis. The penis is small, membranous, the flagellum long and thin.

BORNEO, Sandakan (*Baker*), one male.

**Andes bicolor sp. nov.**

*Female.*—Length, 3.6 millimeters; tegmen, 4.4. Dark brown; carinæ of vertex and frons lighter with three or four dark marks, a mark across gena at base of antenna and the posterolateral portions of pronotum lighter. Basal portion of tegmina to near apex of clavus dark brown with two light marks, one along first claval vein and the other on costa near base to Cu f, a small dark mark at apex of costal cell divided from basal mark by a diagonal hyaline mark, the rest of tegmen hyaline with the apical cells slightly fuscous with the typical V-shaped light mark; veins same color as membrane, granules minute, same color as veins. Wings hyaline, white, slightly fuscous over anal area, veins fuscous in fuscous area and at base, light in rest of wing.

BORNEO, Sandakan (*Baker*), one female. This has such a distinct coloration that I do not hesitate to describe the species from a single female.

**Andes nexus (Walker).**

*Cixius nexus* WALKER, Proc. Journ. Linn. Soc. London 1 (1857) 148.

This species stands under *Brixia* in the British Museum collection. I have three female specimens from Pontianak, Borneo, which agree with the type and which I consider to be the same.

Brown; darker between carinæ and on sides of clypeus and genæ, carinæ lighter with many small, brown spots; pronotum darker in middle and with some small brown dots on lateral portion; mesonotum dark brown; front femora with a dark band near apex; abdomen dark brown. Tegmina with a distinct design, the basal mark extending from base to near apex of clavus between first claval vein and Cu; subbasal extending from middle of costa, where there is a small, triangular, hyaline patch in middle, to apex of clavus, the margins darker than the rest; median mark forming a small line between R and $M_{3+4}$; apical cells fuscous with the lighter design fairly distinct; veins same color as membrane, with small brown granules, the cross veins and apical cross veins light against the surrounding fuscous membrane. Wings fuscous with dark veins.

**Andes ocellatus sp. nov.**

*Female.*—Length, 4.8 millimeters; tegmen, 6.5. Brown; darker between carinæ of head and the middle of pronotum and mesonotum; front femora with a dark band near apex. Tegmina with a distinct typical design in light brown, the basal mark extending between first claval vein and Cu, and from base to apex of clavus, the subbasal mark on costa extends a little basad of middle to stigma and proceeds to apex of clavus and meets the median mark over Cu; a little apical of the fork there is a distinct dark brown mark with a white central spot; apical cells fuscous with the V-shaped hyaline space distinct; veins same color as membrane with small brown granules.

LUZON, Nueva Vizcaya Province, Imugan (*Baker*), one female. This is such a distinct species on account of the ocellus in the tegmen and the size that I decided to describe it from the single female.

The following species belong to the genus *Andes*:

**Andes tortricomorphus** (Kirkaldy). Plate 2, fig. 28.

*Leirioessa tortricomorpha* KIRKALDY, Hawaiian Sugar Planters' Exp. Sta. Ent. Bull. 3 (1907) 112, pl. 8, figs. 19–21.

**Andes vitiensis** (Kirkaldy).

*Leirioessa vitiensis* KIRKALDY, Hawaiian Sugar Planters' Exp. Sta. Ent. Bull. 3 (1907) 112.

**Andes lamononi** (Muir).

*Leirioessa lamononi* MUIR, Proc. Haw. Ent. Soc. IV 3 (1921) 567.

**Andes pulchra** (Muir).

*Leirioessa pulchra* MUIR, Rec. Ind. Mus. 24 (1922) 347.

**Andes meander** (Walker).

*Cixius meander* WALKER, List Hom. Ins. 1 (1851) 349.
*Brixia meander* (Walker) DISTANT, Fauna Brit. Ind., Rhyn. 3 (1906) 270.
*Leirioessa meander* (Walker) MUIR, Rec. Ind. Mus. 24 (1922) 348.

**Andes nubilus** (Walker).

*Cixius nubilus* WALKER, List Hom. Ins. Supp. (1858) 80.
*Brixia nubila* (Walker) DISTANT, Fauna Brit. Ind., Rhyn. 3 (1906) 270.
*Leirioessa nubila* (Walker) MUIR, Rec. Ind. Mus. 24 (1922) 348.
*Brixia subfasciata* STÄL, Berl. Ent. Zeit. 3 (1859) 320.

**Andes humeralis** (Walker).

*Brixia humeralis* WALKER, Journ. Linn. Soc. Zool. 10 (1868) 114.

**Andes geometrinus** (Distant).

*Brixia geometrina* DISTANT, Ann. & Mag. Nat. Hist. VIII 8 (1911) 746.

**Andes inornatus** (Distant).

*Brixia inornata* DISTANT, Ann. & Mag. Nat. Hist. VIII 8 (1911) 745.

This species differs in having four Rs and seven Ms; namely, $M_1$, a, b, c, 2, 3, 4.

**Andes plagosus** (Distant).

*Brixia plagosa* DISTANT, Ann. & Mag. Nat. Hist. VIII 8 (1911) 745.

**Andes elongatus** (Distant).

*Brixia elongata* DISTANT, Ann. & Mag. Nat. Hist. VIII 8 (1911) 746.

**Andes migratorius** (Distant).

*Brixia migratoria* DISTANT, Ann. & Mag. Nat. Hist. VII 19 (1907) 279.

**Andes variolosus** (Distant).

*Brixia variolosa* DISTANT, Ann. & Mag. Nat. Hist. VIII 8 (1911) 746.

This species differs from the typical form in having a short but distinct Sc + R stalk, four Rs and six Ms; namely, $M_1$, a, b, 2, 3, 4. It comes near to *Brixidia*, and it may be necessary to place it in a new genus.

# ILLUSTRATIONS

## PLATE 1

FIG. 1. *Andes simplex* sp. nov., male genitalia, lateral view.
2. *Andes decoloratus* sp. nov., male genitalia, lateral view.
3. *Andes decoloratus* sp. nov., left genital style, full view.
4. *Andes decoloratus* sp. nov., ædeagus, right side of apex.
5. *Andes trispinosus* sp. nov., male genitalia, lateral view.
6. *Andes trispinosus* sp. nov., ædeagus, right side of apex.
7. *Andes serratus* sp. nov., male genitalia, lateral view.
8. *Andes serratus* sp. nov., ædeagus, right side of apex.
9. *Andes tridentatus* sp. nov., male genitalia, lateral view.
10. *Andes quadrilaminatus* sp. nov., male genitalia, lateral view.
11. *Andes quadrilaminatus* sp. nov., ædeagus, ventral view of apex.
12. *Andes spinosus* sp. nov., male genitalia, lateral view.
13. *Andes fictus* sp. nov., male genitalia, lateral view.
14. *Andes maculifrons* sp. nov., male genitalia, lateral view.
15. *Andes ornatus* sp. nov., male genitalia, lateral view.
16. *Andes ornatus* sp. nov., male genitalia, full view.
17. *Andes ornatus* sp. nov., ædeagus, left side.
18. *Andes ornatus* sp. nov., ædeagus, right side, showing apodeme of penis and ejaculatory duct diagrammatically.
19. *Andes pulchellus* sp. nov., male genitalia, lateral view.
20. *Andes brunneus* sp. nov., male genitalia, lateral view.

## PLATE 2

FIG. 1. *Andes furcatus* sp. nov., male genitalia, lateral view.
2. *Andes parvus* sp. nov., male genitalia, lateral view.
3. *Andes stramineus* sp. nov., male genitalia, lateral view.
4. *Andes unifasciatus* sp. nov., male genitalia, lateral view.
5. *Andes dubiosus* sp. nov., ædeagus, ventral view.
6. *Andes dubiosus* sp. nov., male genitalia, lateral view.
7. *Andes pseudobrunneus* sp. nov., male genitalia, lateral view.
8. *Andes brunniceps* sp. nov., male genitalia, lateral view.
9. *Andes undulatus* Stål, male genitalia, lateral view.
10. *Andes marmoratus* (Uhler), male genitalia, lateral view.
11. *Andes marmoratus* (Uhler), apex of ædeagus with cucullus curved to left.
12. *Andes usitatus* sp. nov., male genitalia, lateral view.
13. *Andes serrulatus* sp. nov., male genitalia, lateral view.
14. *Andes mindanaensis* sp. nov., male genitalia, lateral view.
15. *Andes angulatus* sp. nov., base of genital styles.
16. *Andes angulatus* sp. nov., male genitalia, lateral view.
17. *Andes indistinctus* sp. nov., male genitalia, lateral view.
18. *Andes indistinctus* sp. nov., right genital style.

19. *Andes inaequalis* sp. nov., male genitalia, lateral view.
20. *Andes bakeri* sp. nov., male genitalia, lateral view.
21. *Andes cucullatus* sp. nov., male genitalia, lateral view.
22. *Andes cucullatus* sp. nov., male genitalia, full view.
23. *Andes mitellatus* sp. nov., right genital style, full view.
24. *Andes mitellatus* sp. nov., male genitalia, lateral view.
25. *Andes insolitus* sp. nov., male genitalia with ædeagus dissected out, lateral view.
26. *Andes insolitus* sp. nov., ædeagus, right side view.
27. *Andes distinctus* sp. nov., male genitalia, lateral view.
28. *Andes tortricomorphus* (Kirkaldy), left tegmen; *bm*, basal mark; *sbm*, subbasal mark; *sam*, subapical or median mark; *am*, apical mark; *C*, costa; *Sc*, subcosta; *R*, radius; *Cu*, cubitus; *Cl*, claval veins.

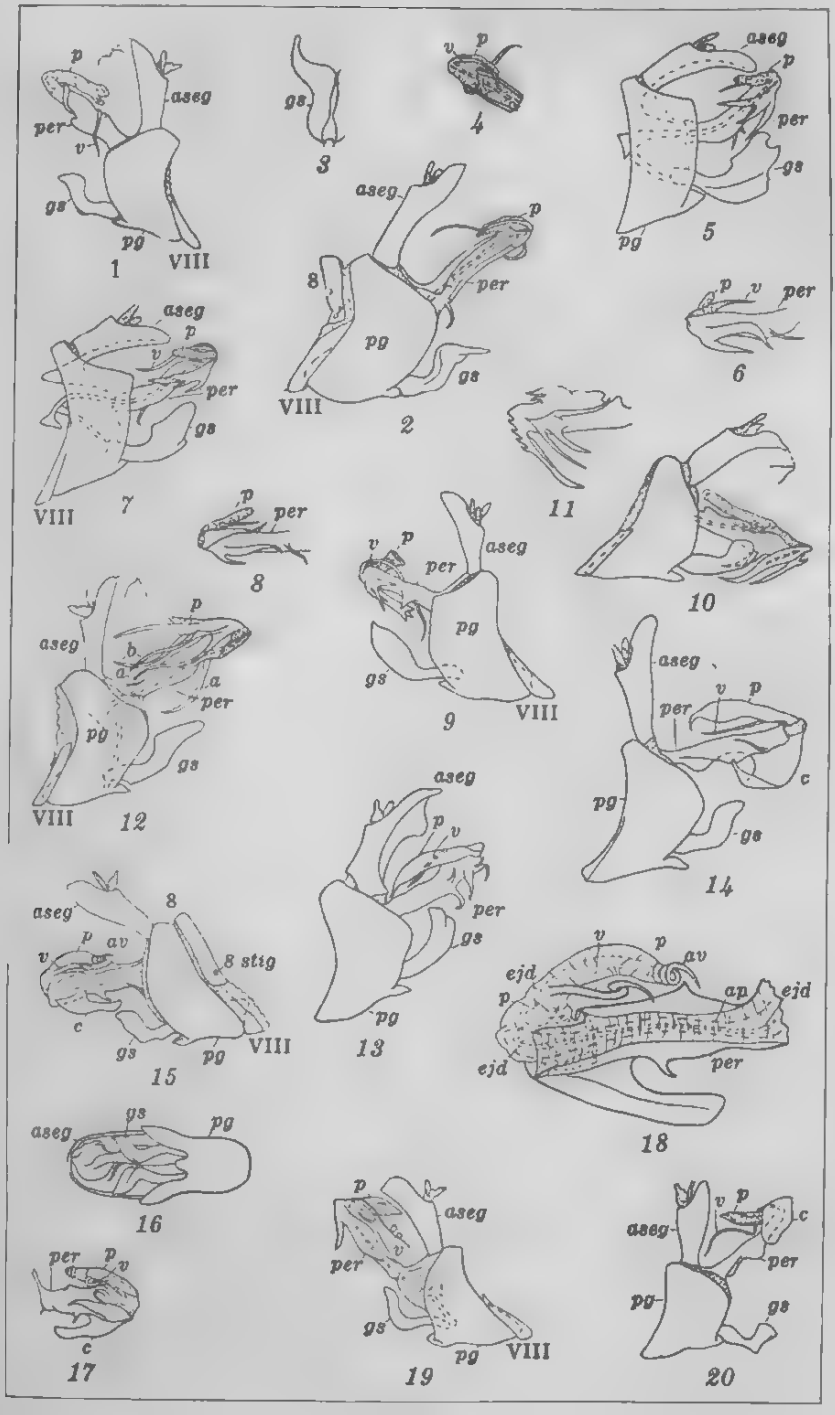
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PLATE 1.

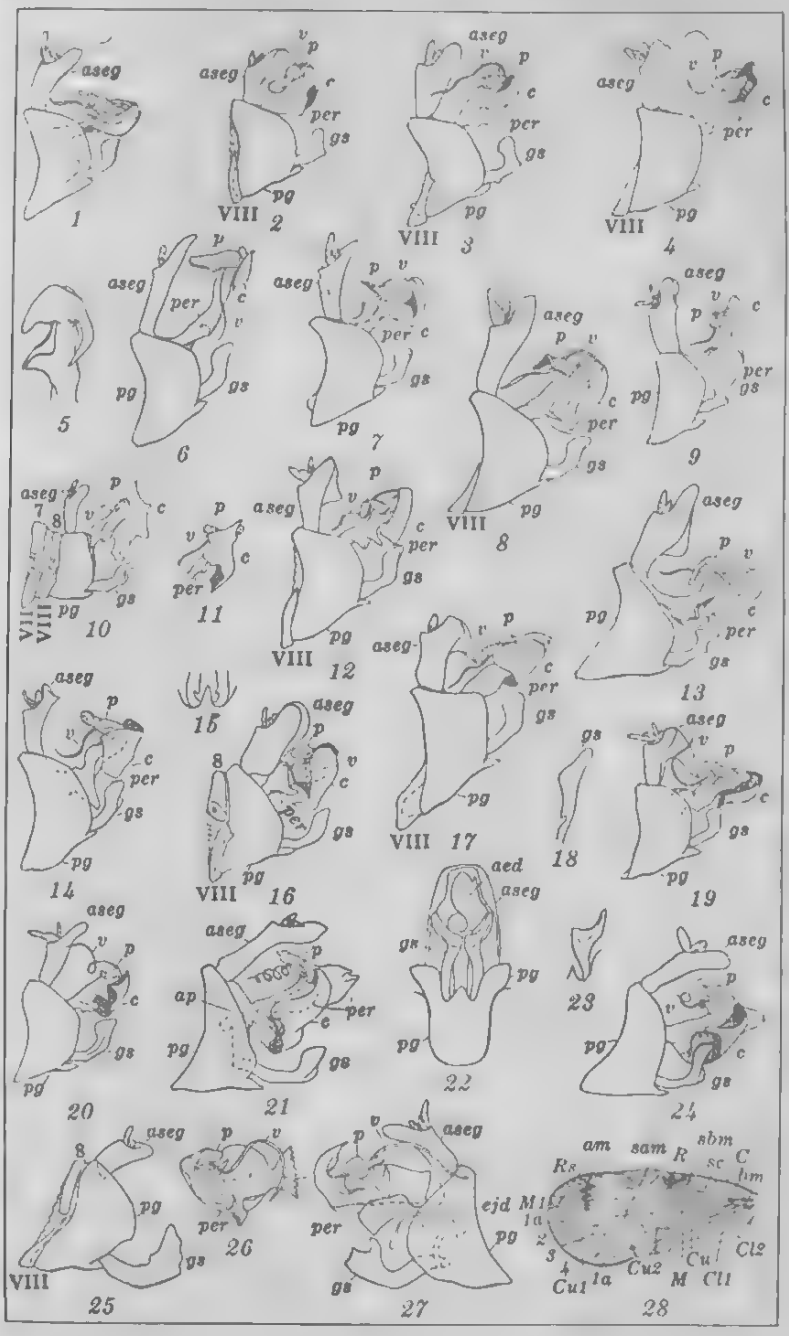
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PLATE 2.

# HELMINTH PARASITES OF HOGS IN THE PHILIPPINE ISLANDS

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*Of the Bureau of Animal Industry, Department of Agriculture, Washington*

TWO PLATES

This report lists the helminth parasites collected by me from hogs slaughtered in the Azcarraga abattoir in Manila; hogs that succumbed to disease and were autopsied in the clinic of the College of Veterinary Science of the University of the Philippines at Los Baños, Laguna Province, Luzon; and hogs killed for food in the vicinity of Los Baños. One species of parasite is listed from a hog from Pampanga Province, Luzon.

Prior to my investigations of parasites of domestic animals in the Philippine Islands, begun in January, 1921, and continued until the spring of 1923, only two species of helminths from swine had been actually recorded from the Philippines, although the occurrence of two additional species appears to have been generally known or suspected. The published records are those of Boynton (1914), who records the kidney worm of swine (*Stephanurus dentatus* Diesing, 1839) as occurring in native as well as in imported swine, and *Metastrongylus* species as occurring in swine presumably imported from foreign countries. The apparently known though not definitely recorded species are *Cysticercus cellulosæ* (Gmelin, 1790), reported by Schwartz and Tubangui (1922) on the basis of data obtained from the Bureau of Agriculture, through the courtesy of Dr. Stanton Youngberg; and the common intestinal roundworm of hogs, *Ascaris lumbricoides* Linnæus, reported from Philippine hogs by me in 1922. In addition to the above-mentioned species, the occurrence of *Cysticercus tenuicollis* (Rudolphi, 1810), the larval stage of *Tænia hydatigena* Pallas, 1776 was reported by me in 1922. Six of the eleven species listed in this paper are recorded for the first time from the Philippine Islands.

## TREMATODA

No trematodes have been found in swine in Los Baños and Manila, by me or by my former students.

CESTODA

**Tænia solium** Linnæus.

*Cysticercus cellulosæ*, the larval stage of *Tænia solium*, is a common parasite of Philippine hogs and is of considerable economic and hygienic importance. It occurs in about 1.5 per cent of the hogs slaughtered in Manila. Specimens were collected in Manila and Los Baños. Reported by Schwartz and Tubangui (1922) and by Schwartz (1922).

**Tænia hydatigena** Pallas.

*Cysticercus tenuicollis* is the larval stage of a dog tapeworm, *Tænia hydatigena*, a parasite that has not yet been recorded from Philippine dogs. Reported by me (1922) from the abdominal cavity of a hog from Pampanga Province.

NEMATODA

**Ascaris lumbricoides** Linnæus, 1758.

*Ascaris lumbricoides* is not very common in hogs slaughtered for food in Manila. Records on the incidence of this parasite in hogs in Los Baños were published by me in 1922. I encountered a few cases of heavy infestations with this parasite among young pigs, and in several instances the larval stages of *Ascaris* were found in the lungs of pigs autopsied in the clinic of the College of Veterinary Science.

**Hyostrongylus rubidus** (Hassall and Stiles, 1892).

These are very slender reddish nematodes, located on the mucosa of the stomach. The parasites are either straight or coiled in their normal location. The males are about 5 millimeters in length, and the females range from 8 to 8.5. The maximum width of these worms is only a little over 0.1 millimeter.

These worms are frequently associated with a catarrhal inflammation of the mucosa of the stomach, and sometimes with an extensive ulceration of the stomach wall. The parasites have been encountered, however, in normal stomachs, and pathological conditions of the stomach mucosa such as may be associated with the worms may occur in the absence of the parasites.

These parasites were commonly encountered in the stomach of hogs autopsied in Los Baños.

**Œsophagostomum dentatum** (Rudolphi, 1803).

These are small whitish worms, from 8 to 15 millimeters long, the maximum size being attained by the females only. The

larval stages of the parasite occur in nodules in the wall of the large intestine and cæcum, in the lumen of which organs the adults can be found. The parasites are of very common occurrence in the Philippines. Practically all hogs autopsied in Los Baños contained both larval and adult parasites, although the latter were not quite so common as the former. This species was also found to be abundant in hogs slaughtered in Manila.

**Stephanurus dentatus** Diesing, 1839.

This is the well-known kidney worm of swine, and was first reported from the Philippines by Boynton in 1913. The parasites are found, not only in the kidney and the fat surrounding the kidney, but also in the liver, lungs, pleural cavity, lumbar muscles, spleen, and spinal cord.

Boynton (1914) states that of 2,000 hogs examined in a Manila abattoir nearly 50 per cent were infested with this parasite. These hogs had been reared in Luzon and came from Batangas, Bulacan, Cavite, Rizal, Zambales, Tarlac, Pampanga, and Nueva Ecija Provinces and from Manila.

I have found this parasite to be quite common in hogs in Los Baños and in hogs slaughtered in Manila. According to information given to me by the meat inspector of the Azcarraga abattoir in Manila, native hogs are less likely to be heavily infested with *Stephanurus dentatus* than imported hogs.

**Metastrongylus elongatus** (Dujardin, 1845).[1]

This is the only species of lungworm in hogs that I found in the Philippines. The parasites are slender and whitish; the males attain a length of about 2.5 centimeters, and the females, about 5. These parasites occur in the trachea, bronchi, and bronchioles. In cases of heavy infestation they may produce bronchitis. *Metastrongylus elongatus* was frequently encountered in hogs slaughtered in Los Baños, and heavy infestations were by no means uncommon. *Metastrongylus* species is recorded by Boynton (1914) from Manila.

**Arduenna strongylina** (Rudolphi, 1819).

This parasite is commonly associated with *Hyostrongylus rubidus* on the mucosa of the stomach, and may be readily dis-

[1] Since this paper was written a new species of lungworm from swine has been described by Gedoelst (1923) under the name *Metastrongylus salmi*. An examination of specimens from a bottle containing lungworms from Philippine swine showed that *Metastrongylus salmi* Gedoelst, 1923, has been collected in the Philippine Islands.

tinguished from the latter species by its larger size. The males are from 10 to 15 millimeters long and the females may attain a length of 20 millimeters. The maximum width is about 0.4 millimeter.

Stomach lesions similar to those described in connection with *Hyostrongylus rubidus* appear to be associated with this parasite, which is of common occurrence in hogs in Los Baños and Manila.

**Gnathostoma hispidum** Fedtchenko, 1872.

This is a relatively large stomach worm with a distinct head bulb containing 9 to 11 rows of hooks. The entire body is covered with spines.

A single specimen was collected by my former assistant, from a hog slaughtered in Los Baños college. The worm was put in a bottle containing miscellaneous hog parasites, and nothing was given as to the location of the worm or of possible lesions associated with it.

This parasite is known to occur in the stomach of swine in certain parts of the world. It may lie free in the lumen but is usually firmly embedded in the stomach wall, the head and a portion of the body being inserted to a depth of about 5 millimeters. The worm is probably a bloodsucker.

**Trichuris suis** (Schrank, 1788).

This is the whipworm of swine and is of common occurrence in the cæcum of Philippine hogs. Specimens were collected in Manila and in Los Baños.

Over one hundred samples of muscle tissue from the diaphragms of as many hogs were examined microscopically for trichinæ, with negative results. I also failed to detect trichinæ in about twenty samples of muscle tissue from rats. Trichinosis in man has not been recorded in the Philippines.

ACANTHOCEPHALA

**Macracanthorhynchus hirudinaceus** Pallas, 1781.

I have a single specimen of this species, collected from the intestine of a wild hog trapped on the college grounds at Los Baños. I have never encountered this parasite in domestic hogs autopsied in Los Baños and have not seen it in the Azcarraga abattoir in Manila.

The species enumerated above represent but a small fraction of the helminth parasites known to occur in swine in various parts of the world. It is very probable that species not recorded

in this paper occur in the Philippines, and it is hoped that the publication of this preliminary list of parasites from Philippine swine will stimulate other workers in the Philippines to study the helminth fauna of these highly important food animals.

In Table 1 the parasites listed in this paper are arranged in accordance with their location in various organs as observed by me in the course of post-mortem examinations of swine.

TABLE 1.—*Helminth parasites and the organs in swine in which they were found.*

| Species recorded. | Organ. | Frequency of occurrence. |
|---|---|---|
| *Hyostrongylus rubidus* | Stomach | Very common. |
| *Arduenna strongylina* | do | Do. |
| *Gnathostoma hispidum* | do | Rare. |
| *Ascaris lumbricoides* | Small intestine | Common. |
| *Macracanthorhynchus hirudinaceus* | do | Rare. |
| *Œsophagostomum dentatum* | Large intestine | Very common. |
| Do | Cæcum | Do. |
| *Trichuris suis* | do | Common. |
| *Metastrongylus elongatus* | Lungs | Do. |
| *Ascaris lumbricoides* larvæ | do | Not definitely known; apparently common. |
| *Stephanurus dentatus* | do | Rare. |
| Do | Kidney [a] and fat surrounding kidney. | Very common. |
| *Cysticercus cellulosæ* | Muscles [b] | Do. |
| *Cysticercus tenuicollis* | Abdominal cavity | Not known; apparently rare. |

[a] This parasite also occurs in other organs, as noted elsewhere in this paper.

[b] Principally in the tongue, muscles of mastication, muscles of shoulder, neck, and diaphragm.

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# ILLUSTRATIONS

## PLATE 1. ŒSOPHAGOSTOMUM DENTATUM (RUDOLPHI)

FIG. 1. Male and female, enlarged; *x*, position of vulva. Original drawing.

2. Anterior end greatly enlarged; *cg*, cervical groove; *int*, intestine; *lp*, lateral papilla; *oes*, œsophagus. Original drawing.

3. Posterior end of female, greatly enlarged; *an*, anus; *e*, egg; *int*, intestine; *ovij*, ovijector; *ut*, uterus; *vul*, vulva. Original drawing.

4. Posterior end of male, greatly enlarged; *d*, dorsal ray; *ed*, externo-dorsal ray; *el*, externo-lateral ray; *gub*, gubernaculum; *lv*, latero-ventral ray; *ml*, medio-lateral ray; *pl*, postero-lateral ray; *sp*, spicule; *td*, terminal branch of dorsal ray; *vv*, ventro-ventral ray. Original drawing.

5. Bursa of male, side view, greatly enlarged; designations of letters the same as in fig. 4. Original drawing.

## PLATE 2

FIG. 1. *Hyostrongylus rubidus* (Hassall and Stiles), caudal portion of male. From Hassall and Stiles (1892) fig. 1.

2. *Stephanurus dentatus* Diesing, female. From Tayler (1900) fig. 31.

3. *Stephanurus dentatus* Diesing, bursa of male with spicules. From Tayler (1900) fig. 35.

4. *Metastrongylus elongatus* (Dujardin), male and female, × 5. From Neeu-Lemaire (1918).

5. *Arduenna strongylina* (Rudolphi); *an*, anus; *ut*, uterus; *v*, vagina, × 7. From Foster (1912) figs. 10 and 11.

6. *Arduenna strongylina* (Rudolphi); anterior portion of worm, × 500. From Foster (1912) fig. 1.

7. *Arduenna strongylina* (Rudolphi), male; posterior end of body, × 65. From Foster (1912) fig. 3.

8. *Arduenna strongylina* (Rudolphi), female; posterior end of body, × 150. From Foster (1912) fig. 4.

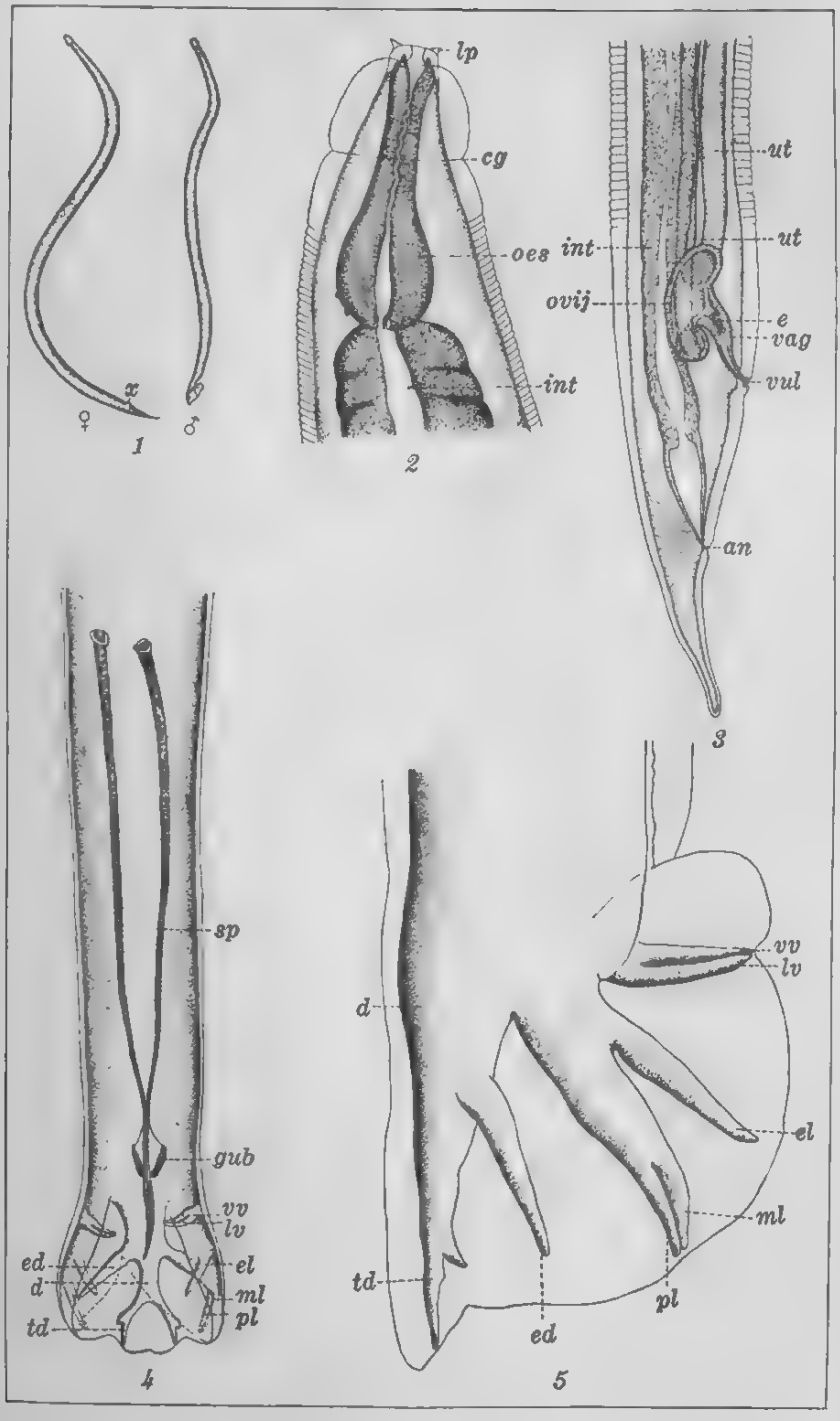


PLATE 1. ŒSOPHAGOSTOMUM DENTATUM (RUDOLPHI).

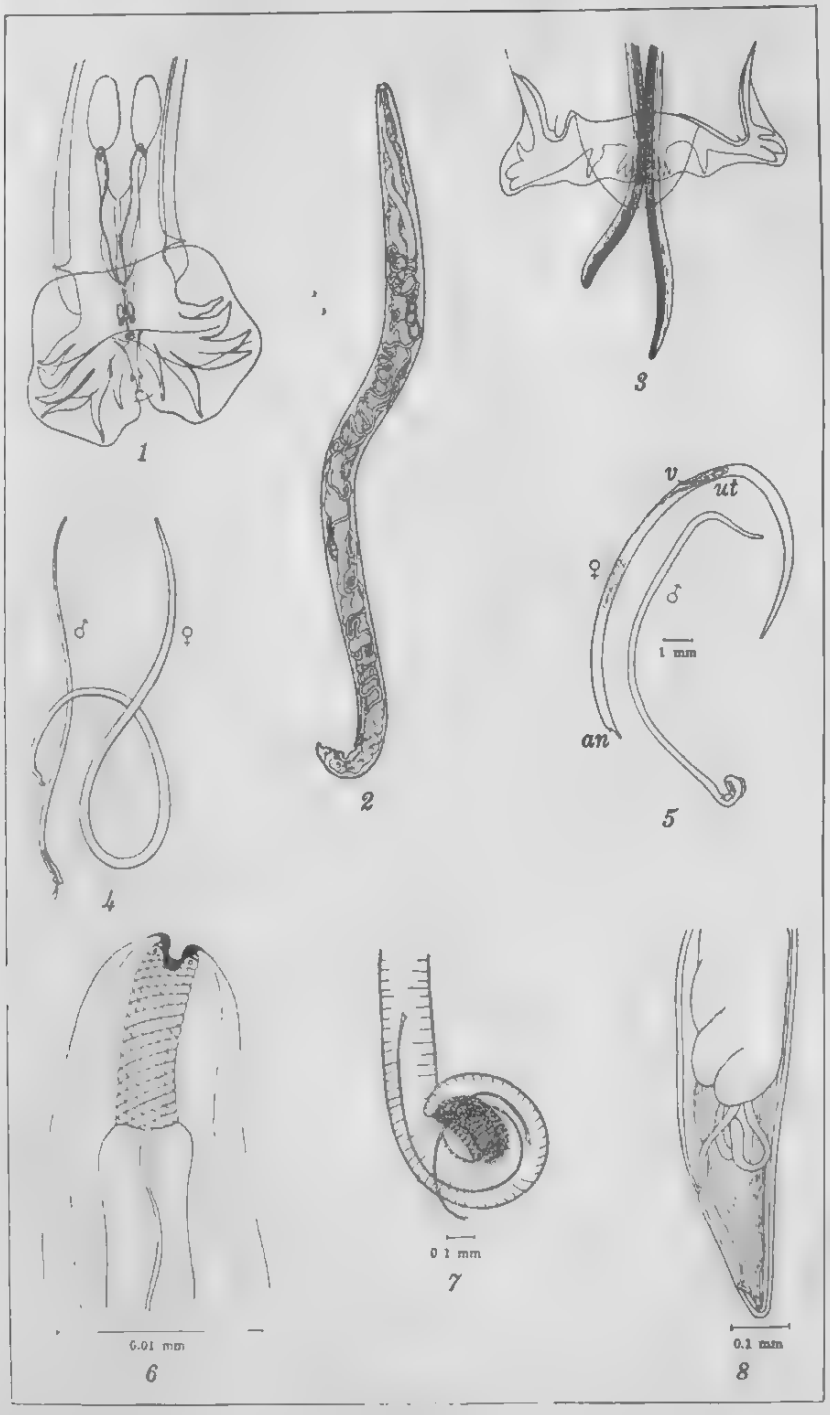


PLATE 2. HELMINTHS FROM HOGS.

# MACROXENOS PIERCEI (ORDER STREPSIPTERA), A NEW GENUS AND SPECIES OF WASP PARASITES OF THE PHILIPPINE ISLANDS

By W. SCHULTZE

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ONE PLATE

Some time ago Mr. C. S. Banks, former entomologist of the Bureau of Science, called my attention to the fact that a certain species of Rhipiphoridæ seemed to be a rather common parasite on one of the commoner solitary wasps found around Manila, *Rhynchium atrum* Saussure (Eumenidæ). Since the Coleoptera of the family Rhipiphoridæ [1] seem to be rare and are very little known as far as the Philippines are concerned, I deemed it advisable to investigate this matter. Very unexpectedly, instead of finding the parasite of the last-mentioned family, a new species of a new genus was discovered, belonging to the order Strepsiptera, an order of insects very little known in the Philippines. Up to the present, to my knowledge, only two species of Strepsiptera are known from these Islands; namely, *Halictoxenos manilae* Pierce [2] and *H. robbii* Pierce. Unfortunately, both species are known and described from female specimens only. The hosts of these, *Halictus* (*Evylaeus*) *manilae* and *H. robbii* Ashmead, belong to the family Apidæ.

The first-mentioned eumenid wasp is at times abundant around Manila and is considered a nuisance in and around houses, since it is very alert in finding and appropriating holes in furniture, key holes, and other suitable holes or crevices for building its nest, and it plugs up such places with mud, thus causing much annoyance. As a matter of fact, the wasp is really beneficial and of considerable economic importance, since it destroys only caterpillars, as food for its young. As many as eleven caterpillars have been found paralyzed in one of its cells. The caterpillars mostly belong to a species of Pyralidæ, injurious to

[1] The species *Rhipidius scutellaris* Heller I discovered to be parasitic on Blattidæ.

[2] Bull. U. S. Nat. Mus. 66 (1909) 151; Proc. U. S. Nat. Mus. 54 (1919) 459.

ornamental and other plants. Knowing the peculiar habit of *Rhynchium atrum* and the manner in which it readily utilizes almost any kind of hole or tube for building its nest, I constructed a series of artificial nesting devices, particularly with the idea in view of obtaining larger numbers of wasp nests for observation, and thus increasing the chances of obtaining parasites. The artificial nesting places provided consisted of 5-centimeter lengths of bamboo, with an outer diameter of from 10 to 11 millimeters and the diameter of the hole from 6 to 9 millimeters. The tubes were placed upright, at suitable intervals, in soft plaster of Paris after the latter had been cast on the inside of the cover of a cylindrical tin can (Plate 1, fig. 6). These disks were so attached to a wall or other suitable location as to place the tubes in a horizontal position. The advantage of using tubes is that any tube after being occupied by a wasp as a nesting place (usually two cells are located in one tube) can be removed from the disk and split open; after the contents have been examined the tube can be tied with fine wire and put back in the disk for further developments and observation. After all the tubes in a disk were filled with nests they were placed in a large glass jar so as to prevent the escape of the emerging wasps.

A few days after the commencement of my experiments, I was successful in having ten tubes occupied by cells of these wasps on September 19 and 20, 1924, each tube containing two cells. The first four (three males and one female) adult specimens of wasps from two tubes emerged on October 13, 1924, twenty-six days after the cells had been finished by the mother wasp. I noticed that in two of the male wasps, hereafter called wasp 1 and wasp 2, the abdomen was slightly distorted and, upon careful examination, found them to be stylopized by pupæ of Strepsiptera.

Wasp 1 had four parasites (two male and two female pupæ), the female pupæ protruding dorsally between the third and fourth segments and the male pupæ protruding between the fourth and fifth segments (Plate 1, fig. 5). The male parasites emerged October 20, 1924, seven days after the wasp emerged from its cell. The female parasites were dissected from the wasp after the death of the latter, which occurred on November 1, 1924.

Wasp 2 had one parasitic male pupa protruding dorsolaterally between the fourth and fifth segments (Plate 1, fig. 4). Up to the death of the wasp this male parasite did not emerge from

the pupa. From the same series of tubes, between October 14 and 24, six wasps (four males and two females) emerged, none of them stylopized. Between October 15 and 24, five wasps emerged, not stylopized. Between October 16 and 24, three wasps emerged, two of which were stylopized, hereafter called wasp 3 and wasp 4.

Wasp 3 had one male pupa protruding dorsally between the fourth and fifth segments; the parasite emerged on October 22, 1924, and the wasp died on November 20, 1924.

Wasp 4 had one female parasite protruding dorsally between the third and fourth segments; the wasp died on November 17, 1924.

From the original disk with ten tubes altogether eighteen wasps emerged, the last on October 16, 1924, so that in this experiment the development of the wasps, from the time of closing the cells to the appearance of the young adults, took from twenty-six to twenty-nine days. I suspect that all these wasps were the offspring of the same mother wasp. I made a rather peculiar observation concerning the habit of this species of wasp between October 19 and 24. An old female, which had the wings slightly torn, closed four of the artificial bamboo nesting tubes in about thirty minutes. Since thirty minutes appeared to me entirely too short a time for the wasp to secure enough caterpillars for eight cells, to lay the eggs, and to close all the cells, I opened the tubes and found all of them to be empty. Several days later another wasp closed twenty tubes in about three hours, and upon examination these also were found to be empty. As to the actual time that it takes for this species of wasp to finish its cells, I have made only one observation. In this case a wasp closed three tubes, each containing two cells and each cell containing from six to nine caterpillars, in four and one-half hours, after which time darkness set in and the wasp disappeared. It appeared as if the mother wasp did not have difficulty in obtaining caterpillars, since it returned at very short intervals with its food supply for the nest. All the caterpillars were of the same species.

Another peculiar observation was made concerning the habits of *Rhynchium atrum* Saussure, in Manila. From the last week of October until the last week of November, 1924, about six hundred tubes as described above were placed in five favorable localities in Manila. Until now (December 5) only six tubes have been found occupied by cells, which seems to indicate that certain seasons of the year are extremely unfavorable for the

breeding of this wasp, probably because of the scarcity of food supply for the offspring. Further observations in this respect are necessary to clear up this point.

The descriptions of the parasites taken from *Rhynchium atrum* Saussure in this experiment follow.

## XENIDÆ (STREPSIPTERA)

### XENINÆ

### Genus MACROXENOS novum

*Male.*—Antenna four-jointed, second joint shortest, cup-shaped, third and fourth joints very elongate, laterally depressed, sublamelliform, fourth joint arising from base of third and nearly equal in length to the latter, both joints forming an irregular fork. Wings with seven veins, five arising from base, radius and premedia abbreviated.

*Female.*—Xenid; cephalothorax similar in general form to that of *Acroschismus* Pierce.

Parasitic on Eumenidæ.

Type species, *Macroxenos piercei* sp. nov., from the Philippine Islands.

**Macroxenos piercei** sp. nov. Plate 1, figs. 1 and 2.

*Male.*—Head, prothorax, mesothorax, and metathorax glossy dark castaneous brown, abdomen lighter grayish brown. Antennæ with the third and fourth sublamelliform joints minutely but very regularly flattish disklike subgranulate. Eyes black; palpi two-jointed; legs yellowish, with four tarsal joints, the latter slightly fuscous. Foreleg with the tarsal joints slightly shorter than the tibia; middle leg with the tarsal joints about equal in length to tibia; hind leg with the tibia much shorter than the combined length of the tarsal joints. Wings with the costal margin thickened to the middle; subcosta also thickened toward middle, then abruptly terminating as a distinct vein, but continued as a fine demarcation line of a cloudy area inclosed by the costa and the latter; radius thickened, abbreviated, extending from apical angle to near middle; premedia also abbreviated, extending from outer margin to beyond middle; media continuous; cubitus absent; three anal veins. The wings in life have a milky or opalescent white appearance, the veins brown. Length from front to anal segment, 3.82 millimeters; wings, from base to apex, 2.2; length of male puparium, 3.82. The three male specimens before me show no perceptible variations in their characters.

*Female.*—Cephalothorax and head amber colored, lateral margins and demarcation lines brownish.

Measurements [3] of the type specimen are: Width at spiracles, 1.35 millimeters; width of base of head, 1.11; width of head at emargination near base of mandibles, 0.46; width of cephalothorax at base, 1; length from front edge of spiracle to apex of head, 1.11; length from base to apex of cephalothorax, 1.72.

Measurements of the female cotype specimen are: Width at spiracles, 1.32 millimeters; width of base of head, 1; width of head at emargination near base of mandibles, 0.45; width of cephalothorax at base, 1.11; length from front edge of spiracles to apex of head, 1.05; length from base to apex of cephalothorax, 1.65.

*Host.—Rhynchium atrum* Saussure (Eumenidæ), Manila, P. I., October and November, 1924 (*Schultze*).

I name this species in honor of Mr. W. Dwight Pierce, who has done much good work on the order Strepsiptera.

The two females and two males here discussed came from wasp 1 and were attached to its abdomen, as indicated in Plate 1, fig. 5. The male puparium came from wasp 2, protruding from its abdomen, as shown in Plate 1, fig. 4.

The female that I obtained from wasp 4 shows rather strong differences in the general form of the cephalothorax as well as in the demarcation lines, so much so that I am still in doubt whether to consider it as a variation of the above-described species or as still another new species. Since it was found parasitic on the same species of wasp, I feel inclined at present to leave this question pending until more material can be obtained. This specimen is shown on Plate 1, fig. 3. Its measurements are: Width at spiracles, 1.57 millimeters; width of base of head, 1.23; width of head at emargination near base of mandibles, 0.51; width of cephalothorax at base, 1.05; length from front edge of spiracle to apex of head, 1.09; length from base to apex of cephalothorax, 1.77.

The abdomen of this as well as of the two other female specimens is almost entirely filled with subovoid or subglobular bodies, which have the appearance of undeveloped ova.

[3] In taking these measurements I followed exactly the system indicated by Pierce, Proc. U. S. Nat. Mus. 54 (1919) 406, text fig. 5.

# ILLUSTRATION

[Drawings by W. Schultze.]

PLATE 1

FIG. 1. *Macroxenos piercei* sp. nov., male.
2. *Macroxenos piercei* sp. nov., cephalothorax of female.
3. *Macroxenos* sp., female.
4. *Rhynchium atrum* Saussure, abdomen of wasp with attached male puparium of *Macroxenos piercei* sp. nov.
5. Abdomen of wasp with two female pupæ and two empty male puparia attached.
6. Artificial nesting tubes.

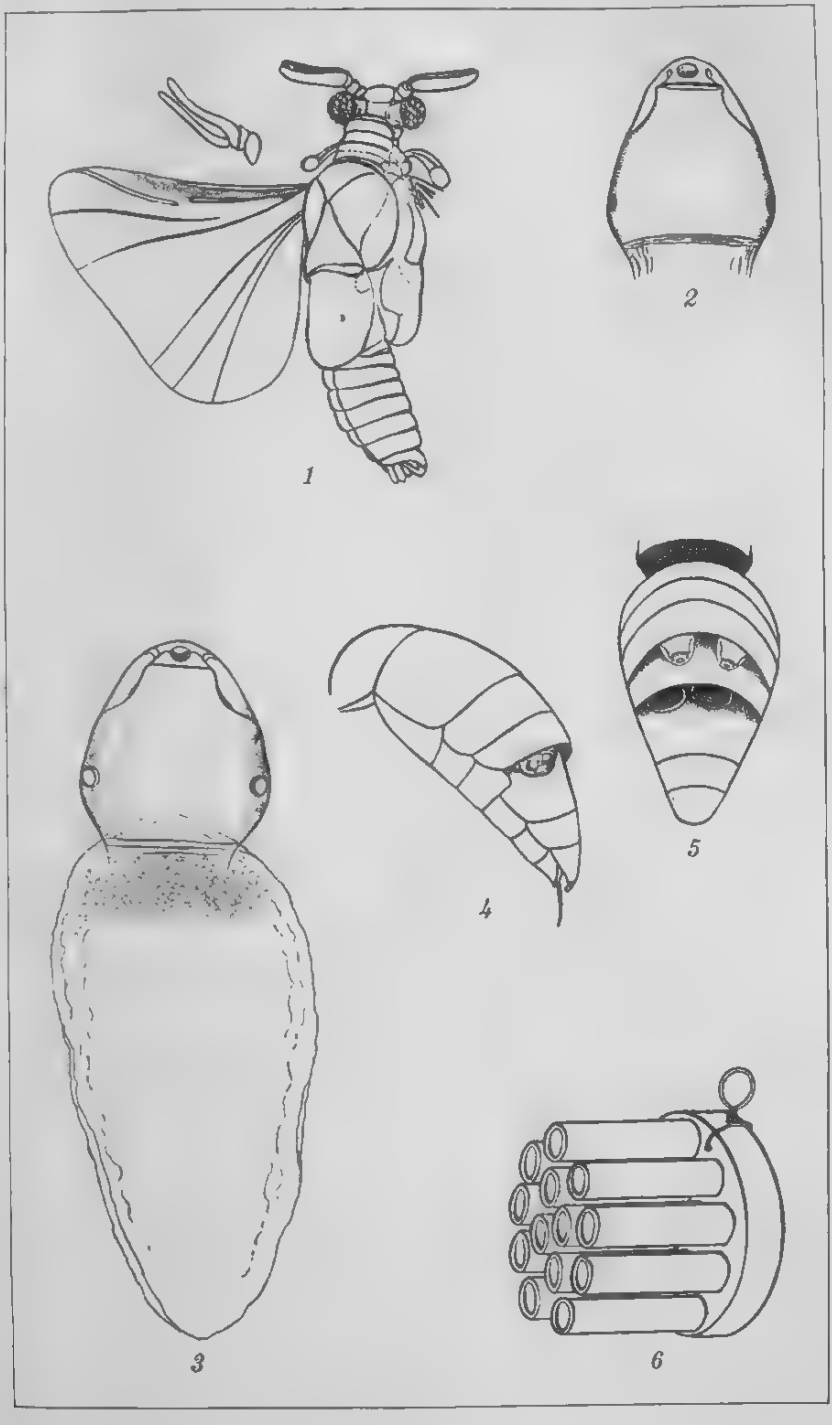


PLATE 1.

# THE COMPARATIVE RESISTANCE TO FOOT ROT OF VARIOUS CITRUS SPECIES AS ROOT STOCKS

By H. ATHERTON LEE

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ONE PLATE AND ONE TEXT FIGURE

Foot rot is a disease of *Citrus* trees very common in countries of commercial citrus production. In the United States descriptions of the disease have been published by Galloway,(3) by Swingle and Webber,(8) and by Stevens;(7) it occurs in both Florida and California. Galloway(3) in 1889 described the disease as of long duration in southern Europe at that time, and quoted references showing that it occurred in the Azores as early as 1840. Fawcett(1) reports the disease from Cuba.

Foot rot has been observed by me in Japan, upon trees for which *Poncirus* (*Citrus*) *trifoliata* has been used as the stock. The disease is not uncommon in Japan. Foot rot is very common and widespread in South China, especially upon the seedling sweet orange trees, and is rather destructive; together with bark rot and California scaly bark, it causes the wiping out of entire orchards. In the mountain districts of Java also, where seedling sweet oranges are grown, foot rot is not uncommon and it causes very severe losses.

In the Philippines foot rot has not been previously reported, although it is rather commonly found wherever seedling sweet oranges are grown or where sweet orange stock is used for *Citrus* species. In such plantings as the *Citrus* collection at the Lamao Horticultural Station, the disease is very destructive, causing death of mature trees when no control methods are attempted.

It has been possible at the Lamao Horticultural Station, in Lamao, Bataan Province, Luzon, to obtain some comparative data of the susceptibility or resistance of several of the *Citrus* species to foot rot. There are two orchards at that station consisting of collections of commercial citrus varieties from various countries and for these varieties different stocks have

been used upon which to bud the introduced varieties. Very fortunately, carefully prepared labels were attached to the trees, showing not only the budded variety, but the stock employed.

Foot rot first became evident in the orchards at Lamao in 1918, and by 1920 was very prevalent in the older of the two orchards of introduced varieties. With constant association with the orchard a correlation gradually became evident between the occurrence of the disease and the character of the stocks employed. To corroborate the impression of this correlation a count was made of the occurrence of the disease and the stocks of the trees upon which it occurred. The record of this count is presented here.

Before recording and discussing this comparative susceptibility, since foot rot is a new disease to most of the horticulturists of the Philippines, a short description may be of some assistance.

## DESCRIPTION OF FOOT ROT

The first indication of the occurrence of the disease is the formation of drops of gum exuding through the bark of the tree, usually just above the surface of the soil, rarely more than 35 to 50 centimeters above the surface. If the lesion is older the bark will appear to be depressed and cracking slightly. In more-advanced lesions the healthy tissues of the bark attempt to heal over the dead cracked bark and sometimes succeed for a time, forming a very definite line of demarcation around the lesion. The lesions are frequently just as widely extended laterally as longitudinally and often run down on the large roots near the surface connecting with the trunk and in some cases entirely girdle such roots. By cutting into one of the lesions it is found that the bark is dead, masses of gum are uncovered under the dead bark, and the wood beneath is discolored.

Affected trees may not show the effects in the foliage for a year or two; but, as the lesions at the base of the trunk spread and girdling becomes more complete, the foliage yellows and gradually becomes thinner, and the leaves drop until the tree is barren and lifeless.

The lesions of the disease are shown much more clearly in the photographs reproduced in Plate 1 than is possible from a written description.

Fawcett(2) isolated a fungus from foot rot lesions, which upon inoculation in healthy trees produced typical foot rot. This pathogenic fungus was subsequently described by Sherbakoff(6) as *Phytophthora terrestria*.

COMPARATIVE SUSCEPTIBILITY OF ROOT STOCKS

Figure 1 and Table 1 show the layout of the two orchards of citrus collections and the occurrence of foot rot. The data shown in fig. 1 have been summarized and are presented in Table 2.

TABLE 1.—*Showing the occurrence of the various citrus stocks.*

[SO, sweet orange; CE, *Citrus excelsa;* Cal, calamondin; P, pummelo; Sour, sour orange. Under each row are given for each tree the tree number, the budded variety, the stock, and remarks.]

Orchard A:

Row 1—
- Tree 1. Valencia O; SO; foot rot.
- 2. Valencia O; SO.
- 3. Tizon mandarin O; SO.
- 4. Tizon mandarin O; SO.
- 5. Tizon mandarin O; CE.

Row 2—
- Tree 1. Valencia O; Cal; poor bud union.
- 2. Valencia O; Cal; poor bud union.
- 3. Ladu mandarin O; P.
- 4. Dead.
- 5. Igorot orange; unknown.

Row 3—
- Tree 1. Out.
- 2. Out.
- 3. Native lime; SO.
- 4. Native lime; SO; foot rot.
- 5. Calpi; SO; foot rot.
- 6. Calpi; CE.
- 7. Tangelo; Cal; poor growing condition.
- 8. Out.
- 9. Lemon variety; SO; foot rot.

Row 4—
- Tree 1. Native pummelo; SO.
- 2. Native pummelo; SO.
- 3. Out.
- 4. Native pummelo; SO.
- 5. Calpi; SO; foot rot.
- 6. Calpi; SO.
- 7. Native pummelo; SO; foot rot.
- 8. West Indian lime; SO; foot rot.
- 9. West Indian lime; SO.
- 10. West Indian lime; SO.

Row 5—
- Tree 1. Murrill orange (lime); SO; foot rot.
- 2. Murrill orange (lime); SO; foot rot.
- 3. Native sweet orange; SO.
- 4. Native sweet orange; SO; foot rot.
- 5. Ellen grapefruit; SO; foot rot.
- 6. Ellen grapefruit; SO; foot rot.

TABLE 1.—*Showing the occurrence of the various citrus stocks*—Ctd.

Orchard A—Continued.

Row 6—
- Tree 1. Pernambuco grapefruit; unknown.
- Tree 2. Pernambuco grapefruit; unknown.
- Tree 3. Oneco mandarin orange; Cal; good bud unions between Calamondin and Oneco mandarin orange.
- Tree 4. Oneco mandarin orange; Cal; good bud unions between Calamondin and Oneco mandarin orange.

Row 7—
- Tree 1. Oneco mandarin orange; SO.
- Tree 2. Oneco mandarin orange; SO.

Row 8—
- Tree 1. Sampson tangelo; SO; foot rot.
- Tree 2. Sampson tangelo; SO; foot rot.
- Tree 3. Marsh grapefruit; SO; foot rot.
- Tree 4. Marsh grapefruit; SO; foot rot.
- Tree 5. Triumph grapefruit; SO.
- Tree 6. Triumph grapefruit; SO; foot rot.

Row 9—
- Tree 1. Pink pummelo; SO; foot rot.
- Tree 2. Pink pummelo; SO; foot rot.
- Tree 3. Lemon variety; SO.
- Tree 4. Dead; SO.
- Tree 5. Pineapple orange; SO; foot rot.
- Tree 6. Pineapple orange; SO; foot rot.
- Tree 7. Washington navel; SO; foot rot.
- Tree 8. Washington navel; SO.
- Tree 9. Jaffa orange; SO; foot rot.
- Tree 10. Jaffa orange; SO.

Row 10—
- Tree 1. Japanese orange (sour); SO; foot-rot lesions sharply delimited above bud union.
- Tree 2. Japanese orange (sour); SO.
- Tree 3. Ruby orange; SO; foot rot.
- Tree 4. Ruby orange; SO.
- Tree 5. Clark lemon; SO.
- Tree 6. Clark lemon; SO.
- Tree 7. Holdfast orange; SO.
- Tree 8. Holdfast orange; SO.
- Tree 9. Villa Franca lemon; SO.
- Tree 10. Villa Franca lemon; SO; foot rot.
- Tree 11. Out.
- Tree 12. Out.
- Tree 13. Bengal lemon; SO.

Row 11—
- Tree 1. Mediterranean orange; P.
- Tree 2. Mediterranean orange; SO; foot rot.
- Tree 3. Valencia orange; SO.
- Tree 4. Valencia orange; SO.
- Tree 5. Ellen grapefruit; SO.

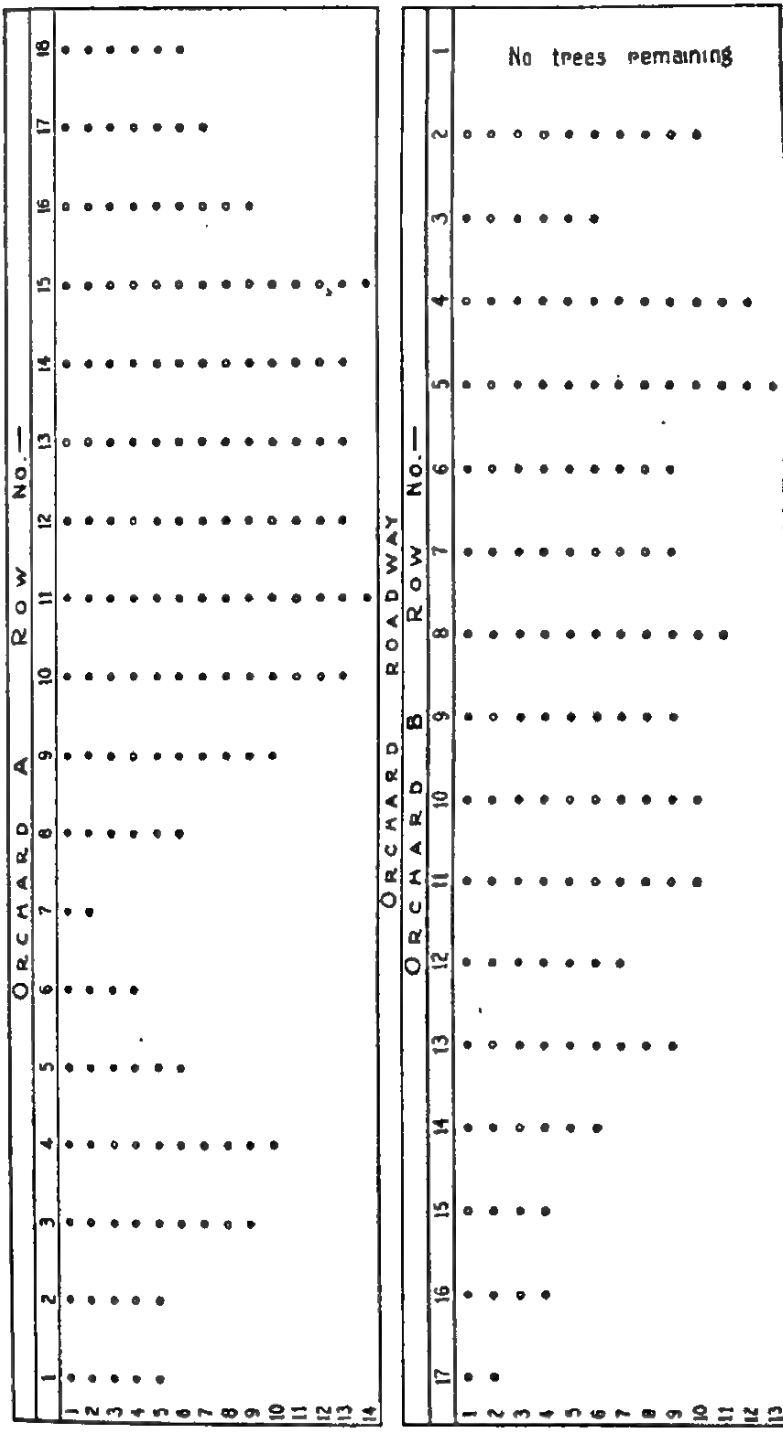


FIG. 1. Diagram of orchards A and B, showing the relative positions of rows and trees.

TABLE 1.—*Showing the occurrence of the various citrus stocks*—Ctd.

Orchard A—Continued.
Row 11—Continued.
Tree 6. Ellen grapefruit; SO.
7. Tahiti lime; SO; foot rot.
8. Tahiti lime; SO.
9. Sicily lemon; SO.
10. Sicily lemon; SO.
11. Dead.
12. Washington navel; SO.
13. Thornless lemon; SO.
14. Thornless lemon; SO.

Row 12—
Tree 1. Triumph grapefruit; SO.
2. Triumph grapefruit; SO.
3. Larantta orange; SO; foot rot.
4. Out.
5. White Siletta; SO.
6. White Siletta; SO; foot rot.
7. Citron; SO.
8. Citron; SO.
9. Calamondin; SO.
10. Out.
11. Jaffa; SO; foot rot.
12. Jaffa; SO; foot rot.
13. Bahia orange; SO.

Row 13—
Tree 1. Out.
2. Out.
3. *Citrus excelsa;* SO.
4. *Citrus excelsa;* SO.
5. Cajel; SO.
6. Cajel; SO.
7. Native lime; SO.
8. Native lime; SO; foot rot.
9. Jaffa orange; SO.
10. Jaffa orange; Cal.
11. *Citrus excelsa;* SO; foot rot.
12. *Citrus excelsa;* Cal.
13. Native lime; SO.

Row 14—
Tree 1. St. Michael orange; SO.
2. St. Michael orange; SO.
3. Kishiu mandarin orange; SO; foot rot.
4. Kishiu mandarin orange; SO.
5. Konda Harun mandarin orange; SO; foot rot.
6. Satsuma; SO.
7. Satsuma; SO.
8. Dead.

TABLE 1.—*Showing the occurrence of the various citrus stocks*—Ctd.

Orchard A—Continued.
Row 14—Continued.
Tree 9. Ruby orange; P.
10. Dancy tangerine; P.
11. Dancy tangerine; P.
12. Sampson tangelo; P.
13. Sampson tangelo; P.
Row 15—
Tree 1. Florida sour orange; P.
2. Florida sour orange; P.
3. Out.
4. Out.
5. Out.
6. Out.
7. *Citrus hystrix;* unknown.
8. *Citrus hystrix;* unknown.
9. Out.
10. Suhat, Philippine *Citrus* species; P.
11. Native lime; SO.
12. Out.
13. Native lime; SO.
14. Native lime; SO.
Row 16—
Tree 1. Out.
2. Out.
3. Native pummelo; SO.
4. Native pummelo; SO.
5. *Citrus webberi;* SO; foot rot.
6. *Citrus webberi;* Cal.
7. Out.
8. Out.
9. Native orange; Cal.
Row 17—
Tree 1. Everbearing lime.
2. Everbearing; unknown.
3. No label.
4. Out.
5. Bellaire; unknown; foot rot.
6. Villa Franca; P.
7. Bellaire; unknown.
Row 18—
Tree 1. Lisbon; P.
2. Lisbon; P; foot rot.
3. Chinese lemon; P.
4. Chinese lemon; P.
5. Excelsior lemon; CE.
6. Native sweet orange; unknown; foot rot.

TABLE 1.—*Showing the occurrence of the various citrus stocks*—Ctd.

Orchard B:
- Row 17—
  - Tree 1. Sampson tangelo; P.
  - 2. Sampson tangelo; P.
- Row 16—
  - Tree 1. Calamondin; CE; foot rot.
  - 2. Calamondin; CE.
  - 3. Out.
  - 4. Le Nestour lime; unknown.
- Row 15—
  - Tree 1. Out.
  - 2. No label.
  - 3. Siamese pummelo; Cal.
  - 4. Siamese pummelo; P.
- Row 14—
  - Tree 1. Calamondin; CE.
  - 2. Calamondin; Cal.
  - 3. Out.
  - 4. No label.
  - 5. Boone orange; CE; foot rot.
  - 6. Boone orange; Cal.
- Row 13—
  - Tree 1. Native pummelo; SO.
  - 2. Out.
  - 3. Siamese seedless pummelo; P.
  - 4. Siamese seedless pummelo; P.
  - 5. Pongkam mandarin orange; lime.
  - 6. No label.
  - 7. Malta blood orange; CE.
  - 8. No label.
  - 9. Native pummelo; Cal.
- Row 12—
  - Tree 1. Magnum bonum orange; SO.
  - 2. Magnum bonum orange; SO.
  - 3. No label.
  - 4. Carleton orange; SO.
  - 5. Royal orange; native *Citrus*.
  - 6. Royal orange; native *Citrus*.
  - 7. Native pummelo; P.
- Row 11—
  - Tree 1. Walters grapefruit; Sour.
  - 2. Walters grapefruit; Sour.
  - 3. Dugat orange; P.
  - 4. Dugat orange; P.
  - 5. Duroi orange; lime.
  - 6. Out.
  - 7. McCarthy grapefruit; P.
  - 8. McCarthy grapefruit; P.
  - 9. Out.
  - 10. Tahiti lime; unknown.

TABLE 1.—*Showing the occurrence of the various citrus stocks*—Ctd

Orchard B—Continued.

Row 10—
- Tree 1. Replant.
- 2. Replant.
- 3. Everglade lime; Cal.
- 4. Everglade lime; Cal.
- 5. Out.
- 6. Out.
- 7. *Citrus hystrix;* CE.
- 8. *Citrus hystrix;* CE.
- 9. Brown orange; SO.
- 10. Brown orange; SO.

Row 9—
- Tree 1. No label; P.
- 2. Out.
- 3. *Citrus hystrix;* Cal.
- 4. *Citrus hystrix;* CE; foot rot.
- 5. *Citrus hystrix;* Cal.
- 6. *Citrus hystrix;* Cal.
- 7. Trinidad lime; Cal.
- 8. Trinidad lime; Cal.
- 9. Native lime; CE.

Row 8—
- Tree 1. *Citrus webberi.*
- 2. *Citrus excelsa;* CE.
- 3. No label.
- 4. Florida sour orange; P.
- 5. Native pummelo.
- 6. *Citrus hystrix;* P.
- 7. Duroi orange.
- 8. No label.
- 9. McCarthy grapefruit; Sour.
- 10. McCarthy grapefruit; Sour.
- 11. Le Nestour lime; CE.

Row 7—
- Tree 1. No label; P.
- 2. Duncan grapefruit; P.
- 3. Pineapple orange.
- 4. Marsh grapefruit; foot rot.
- 5. Enterprise orange.
- 6. Out.
- 7. Out.
- 8. Out.
- 9. Saagkam mandarin orange; Cal.

Row 6—
- Tree 1. Replant.
- 2. Out.
- 3. *Citrus hystrix;* CE.
- 4. *Citrus hystrix;* CE.
- 5. Replant.

TABLE 1.—*Showing the occurrence of the various citrus stocks*—Ctd.

Orchard B—Continued.
Row 6—Continued.
Tree 6. Replant.
7. *Citrus hystrix;* SO; foot rot.
8. Out.
9. Brown sweet orange; CE.
Row 5—
Tree 1. No label.
2. Out.
3. Maltese blood orange.
4. Everbearing orange.
5. Homosassa orange.
6. Maltese blood orange; Cal.
7. McCarthy grapefruit; P.
8. Out.
9. Siamese pummelo; P.
10. Siamese pummelo; P.
11. Suntara mandarin O; CE.
12. Native lime; P.
13. Native lime; P.
Row 4—
Tree 1. Out.
2. Tinder; Cal.
3. Szinkom mandarin O; CE; foot rot.
4. Replant.
5. Florida sour orange; P.
6. Florida sour orange; P.
7. Pineapple orange; Cal.
8. Pineapple orange; CE.
9. King mandarin O; P.
10. King mandarin O; P.
11. Native pummelo; P.
12. Native pummelo; P.
Row 3—
Tree 1. Native lime; CE.
2. Out.
3. Native lime; SO.
4. Native lime; SO.
5. Unknown; CE.
6. Valencia orange; Cal.
Row 2—
Tree 1. Out.
2. Out.
3. Out.
4. Out.
5. Sampson tangelo; P; foot rot.
6. Native lime; Cal.
7. Native lime; Cal.

TABLE 1.—*Showing the occurrence of the various citrus stocks*—Ctd.

Orchard B—Continued.
Row 2—Continued.
Tree 8. Calamondin; unknown.
9. Out.
10. No label.
Row 1—
No trees remaining.

TABLE 2.—*Showing the occurrence of the various citrus stocks throughout orchards A and B and the occurrence of foot rot among these root stocks.*

| Stock. | Orchard A.[a] | | | Orchard B.[b] | | |
|---|---|---|---|---|---|---|
| | Total. | Foot rot cases. | | Total. | Foot rot cases. | |
| | | *Number.* | *P. ct.* | | *Number.* | *P. ct.* |
| Sweet orange, *Citrus sinensis* | 97 | 37 | 38.14 | 9 | 1 | 11.11 |
| Sour orange, *Citrus aurantium* | | | | 4 | 0 | 0.00 |
| Pummelo, *Citrus maxima* | 15 | 1 | 6.66 | 27 | 1 | 3.70 |
| Calamondin, *Citrus mitis* | 9 | 0 | 0.00 | 18 | 0 | 0.00 |
| Limon real, a native Philippine citrus fruit, *Citrus excelsa* | 3 | 0 | 0.00 | 19 | 4 | 21.05 |
| Lime, *Citrus aurantifolia* | 1 | 0 | 0.00 | 2 | 0 | 0.00 |

[a] Orchard A was eight years old at the time of the observation.
[b] Orchard B was five years old at the time of the observation.

The foregoing data first of all show the seriousness of foot rot in the Philippine Islands. It is readily apparent that the limon real (*Citrus excelsa*) which, because of its vigorous aërial growth, has been considered for use as a root stock, is hardly feasible, at least under Philippine conditions. Of the nineteen trees grown on this stock in the five-year-old orchard, 21 per cent showed the disease; it is evident that an orchard on this stock would be very short-lived. Of probably more ready appreciation is the extreme susceptibility of the sweet orange as a root stock. In the eight-year-old orchard more than 37 per cent of the trees showed the disease. The pummelo as a stock seems much more resistant than either the sweet orange or the limon real, showing 6 per cent of the trees affected in the older orchard and 3.74 per cent in the five-year-old orchard. As there were only four trees with sour orange stocks and two trees with lime stocks, the data are far from comprehensive on these two species. The calamondin as a stock is by far the most noteworthy, from these data, and would seem to be resistant to the disease.

Hume,(4) from field observations in Florida, drew the conclusion that stocks showed susceptibility to foot rot in the following

order: Sweet orange, lemon, rough lemon, pummelo, and sour orange. The present data, being based upon actual count, strongly support Hume's order of susceptibility and, in addition, point out the possibilities of the calamondin as a stock for citrus trees and the extreme susceptibility of *Citrus excelsa* as a stock.

The calamondin as a stock for the Valencia orange formed a very poor bud union, it may be noted from Table 1. On the other hand, the Oneco mandarin orange on this stock formed a notably good bud union. The use of the calamondin as a stock for some of the *Citrus* species is worthy of a trial.

It would seem desirable in this connection to point out the predisposition to mottled leaf of citrus trees budded on pummelo stock, shown by Lee in a previous paper.(5) Such predisposition, even though the pummelo as a stock does seem from the foregoing data to be but slightly susceptible to foot rot, would militate against the extensive use of the pummelo under Philippine conditions and its use would be advisable with caution, at least, in other countries. One is led to conclude that the limon real and the sweet orange must be ruled out as stocks for citrus trees in the Philippines, because of their susceptibility to foot rot. The pummelo must be ruled out because it predisposes to mottled leaf citrus trees for which it has been used as a stock. The promising stocks, shown in this paper and the previous paper,(5) are the calamondin, various kinds of the mandarin orange, and the sour orange.

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# ILLUSTRATIONS

## PLATE 1

FIG. 1. Foot rot on grapefruit tree with sweet orange stock. The lesion can be seen to extend down onto the root and well up above the soil.

2. The same lesion as that shown in fig. 1, but the bark has been cut away around the lesion as a remedial treatment and will be disinfected. The callus can be noted, formed by the host plant in an effort to heal over the lesion.

## TEXT FIGURE

FIG. 1. Diagram showing the layout of orchards A and B at the Lamao Horticultural Station and the occurrence of foot rot throughout these orchards.

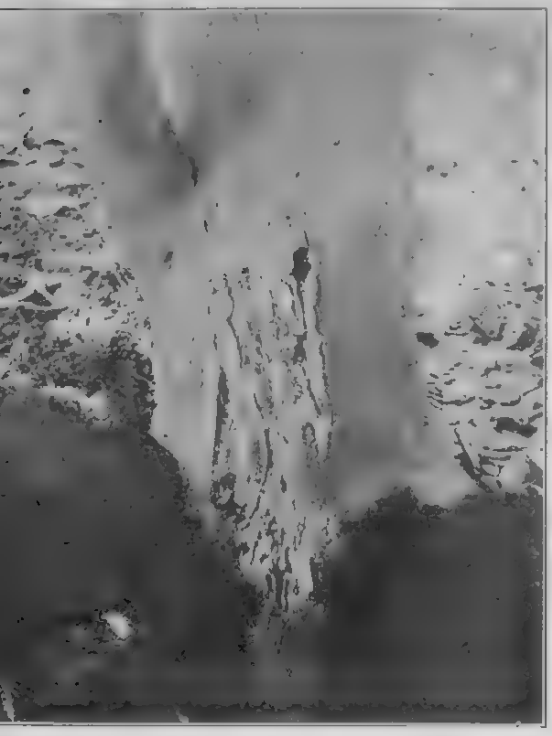

Fig. 1. Foot rot on grapefruit tree.

Fig. 2. Lesion after treatment.

PLATE 1.

# DIE TENEBRIONIDEN (COLEOPTERA) DES INDO-MALAYISCHEN GEBIETES, UNTER BERUECKSICHTIGUNG DER BENACHBARTEN FAUNEN, V

## DIE GATTUNG CEROPRIA

Von HANS GEBIEN

*Hamburg, Germany*

EINE TAFEL

### Genus CEROPRIA Castelnau und Brullé

*Ceropria* CASTELNAU und BRULLÉ, Ann. Sc. Nat. (1829) 396; LACORDAIRE, Gen. Col. 5 (1859) 307; HAROLD, Stett. Ent. Zeitg. 38 (1877) 345–355.

Die Gattung *Ceropria* enthält in den tropischen und subtropischen Gebieten von Afrika, Asien, und Australien 40 bisher benannte Arten. In den Sammlungen ist am häufigsten *C. induta* Wiedemann zu finden, die im indischen und malayischen Gebiet gemein ist. Aus diesem Grunde ziehe ich die Art häufiger zum Vergleich heran, auch wenn ein Vergleich mit einer anderen, eben seltneren Art passender gewesen wäre. Aus Afrika kannte man bisher 3 Arten, von denen nur 2 gut geschieden sind, *C. romandi* und *C. anthracina;* die dritte ist wohl kaum etwas anderes als eine madegassische Rasse von *romandi.* Aber ausser diesen 3 besitze ich noch 5 ausgezeichnete neue afrikanische Arten, so das also auch in diesem Erdteil die Gattung gut vertreten ist. Auch aus dem papuanischen Gebiet habe ich (Nova Guinea XIII) noch einige Arten beschrieben. Aber nirgend ist die Gattung so gut entwickelt wie in Asien; hier finden sich die verschiedensten Formen, herrliche Farben und zahlreiche Arten. Harold hat in seiner Monographie versucht die Arten nach der Färbung zu trennen. Der Versuch kann nicht als geglückt angesehen werden; übrigens kannte er auch nur einen Bruchteil der wirklich vorhandenen Arten. Meist sind die Arten mit metallisch Regenbogenfarben geschmückt; daher ist Zeichnung und Färbung in Worten oder im Bild schwer wiederzugeben. Erfreulicherweise liegt

mir das von ihm bearbeitete Material des Berliner Museums vor, so dass ich über seine Arten und die Auffassung die der Autor von den bekannten Arten hatte nicht im Zweifel bin. Dagegen bin ich bei der Deutung der Arten französicher Autoren auf die Beschreibung angewiesen, die leider oft sehr zu wünschen übrig lässt.

Auf Grund der Untersuchungen von Typen, von sorgfältigem Studium der Beschreibungen und brieflichen Mitteilungen des Herrn Blair können folgende Aenderungen in meinem Catalog[1] vorgenommen werden.

*Ceropria axillaris* Chevrolat, 1878 = *C. humeralis* Harold, 1877.
*Ceropria chrysosticta* Hope, 1842 = *C. superba* Wiedemann, 1823.
*Ceropria femorata* Motschulsky, 1873 = *C. erythrocnema* Castelnau und Brullé, 1831.
*Ceropria impressifrons* Fairmaire, 1882 = *C. versicolor* Castelnau und Brullé, 1831.
*Ceropria pulchra* Hope = *Hemicera zigzaga* Marseul.
*Ceropria violacea* Blanchard ist eine Cnodalonide aus der Verwandtschaft von *Chariotheca*.
*Ceropria insignis* Chevrolat ist nach Blair[2] = *intermedia* Harold.
*Ceropria iris* Chevrolat kann ich nicht deuten; sie ist wahrscheinlich keine *Ceropria*.

Lacordaire's Beschreibung der Gattung ist gut. Die Hauptmerkmale sind die beim Männchen stets erweiterten Vordertarsen und die geknickten Vorder- und Mittelschienen in diesem Geschlecht, die Fühlerglieder sind meist kräftig gesägt. Sehr kompliziert ist der Bau der männlichen Geschlechtswerkzeuge. Ausser dem häutigen Penis, dessen chitinigen Parameren stets zu einer Röhre verwachsen sind, finden sich auffallende äussere und innere Nebenklappen. Dieser Geschlechtsapparat ist so gewaltig, dass er eine weitgehende Oeffnung der Analklappe nötig macht. Bei der *versicolor*-Gruppe sind daher das dritte und vierte Abdominalsegment bis zur Mitte häutig.

Nach Harold könnte man annehmen, das plastische Merkmale so gut wie ganz in der Gattung fehlen. Das ist aber durchaus nicht der Fall. So zeigen mehrere Arten eigentümliche Ausbildung der Deckenspitzen, auch die Dichte der Punkte in den Reihen ist sehr verschieden, neben Arten mit circa 30 bis 40 Punkten in dem vierten Streif finden sich andere mit 60, 80, 100 bis 120 Punkten. Im übrigen kann ich mit Harold fest-

[1] Col. Cat. pars 28 (1910–1911) 382.
[2] Trans. Zool. Soc. London 20 (1915) 535, pl. 16.

stellen, dass die Färbung mit Ausnahme der *induta*-Gruppe recht beständig ist.

*Bestimmungstabelle für die asiatischen Arten der Gattung Ceropria.*

1. Die mittleren Abdominalsegmente des Männchens sind bis zur Hälfte verkürzt und haben daher eine ausserordentlich breite Gelenkhaut, die Fühlerglieder sind nicht gesägt, sondern innen leicht rundlich erweitert, Stirn mit tiefem Eindruck ..... 2.
   Gelenkhaut der Abdominalsegmente schmal, normal, Fühler kräftig, oft auffallend gesägt, Stirn selten mit Eindruck ..... 4.
2. Oberseite einfarbig bräunlich bronze, Schenkel rot (*femorata* Motschulsky). (Sumatra, Java.) .. **C. erythrocnema** Castelnau und Brullé.
   Oberseite mit goldigen Binden, Halsschild mit O-förmiger Makel an jeder Seite, Schenkel schwarz ..... 3.
3. Die Spitzenmakel der Decken ist vorn als Querbinde ausgebildet, eine Längsbinde an den Seiten fehlt dort. O-Makel des Pronotums unterbrochen, Flügeldecken mit gut ausgebildeter Spitze, beim Weibchen mit Knötchen, Analsegment des Weibchens jederseits ungefurcht. (Sunda-Inseln, Hinterindien, Süd-China.) ..... **C. superba** Wiedemann.
   Die Spitzenmakel der Decken besteht aus zwei Längsstreifen an der Naht und am Aussenrand, O-Makel des Pronotums geschlossen, Spitze der Decken in beiden Geschlechtern abgestutzt, Männchen mit winzigen Ausschnitt an den Epipleuren unmittelbar vor der Spitze, beim Weibchen ist das Analsegment jederseits fein gefurcht. (Sunda-Inseln, Hinterindien, Ceylon.) ..... **C. versicolor** Castelnau und Brullé.
4. Flügeldecken nicht mit roten Binden ..... 5.
   Flügeldecken mit roten, nicht metallischen Querbinden oder Flecken .. 22.
5. Die Punkte der Streifen sind kräftig, weniger als 40 Punkte stehen im vierten Streif ..... 6.
   Punkte der Streifen viel feiner, 60 bis 120 im vierten Streif ..... 7.
6. Flügeldecken in den herrlichsten Farben prangend, Halsschild purpurn violett, Basis bei den Grübchen kaum aufgebogen. (Borneo.)
   **C. speciosissima** Gebien.
   Flügeldecken auf den ersten Blick fast einfarbig düster metallisch, mit sehr schmaler, regenbogenfarbener Kreisbinde an Schulter und Spitze, Halsschild schwärzlich mit schwachem, goldigen Fleck, an der Basis neben dem Grübchen kräftig, aber schmal aufgebogen.
   **C. decolorata** sp. nov.
7. Flügeldecken mit stark metallischem Schulter- und Spitzenfleck, der in Regenbogenfarben schillert, oder es sind die matteren Flecken von irisierenden Linien begrenzt ..... 8.
   Flügeldecken einfarbig oder doch ohne irisierende Flecken und Linien ..... 14.
8. Die Stirn mit kräftigem Längseindruck. Hinterschienen des Männchens an der Spitze oben mit kleinem Eindruck ..... 9.
   Die Stirn nicht eingedrückt, Hinterschienen meist ohne den kleinen Eindruck (hierher auch die mir unbekannte *C. striata* Lewis) .... 10.
9. Halsschild herrlich metallisch gefärbt, auch in der Mitte, Punktierung der Streifen weniger eng (circa 80 Punkte im zweiten Streif). (Japan.) ..... **C. sulcifrons** Harold.

Halsschild schwach metallisch, in der Mitte schwärzlich, Deckenstreifen sehr eng (über 100 Punkte im zweiten Streif). (Formosa.)
**C. formosana** Gebien.

10. Schienen sehr dick, die hinteren am Ende oben beim Männchen mit Eindruck, Flügeldecken ziemlich düster gefärbt mit feinen, irisierenden Kreisen an Schulter und Spitze, aber nicht anders gefärbten Flecken. Ueber 100 Punkte im vierten Streifen. (Sumatra.)
**C. amplipennis** sp. nov.

Schienen dünn, normal, die hinteren beim Männchen ohne Eindruck, Flügeldecken mit regenbogenfarbenem Schulter- und Spitzenfleck, bis 80 Punkte im vierten Streif ..... 11.

11. Die Vorderschienen des Männchens sind gerade, die mittleren schwach gebogen. Sehr breite Art, von 12 Millimeter und darüber. (Hinterindien, Tonkin, Japan.) ..... **C. laticollis** Fairmaire.

Flügeldecken leuchtend purpur-violett. (Formosa.)
**C. laticollis var. schenklingi** Gebien.

Vorder- und Mittelschienen des Männchens geknickt und in der Endhälfte leicht tuberkuliert; circa 10 Millimeter grosse Arten ..... 12.

12. Auch der Vorderkörper lebhaft metallisch, Kopf blau. Körper sehr breit, Pronotum in der Mitte am breitesten, nach hinten schwach verengt. Vorderschienen des Männchens stark geknickt, und mit kräftigem Ausschnitt in der Mitte, Analsegment beim Männchen gerade abgeschnitten und eingedrückt. Sehr buntgefärbte Art von den Philippinen ..... **C. mindanaica** sp. nov.

Kopf schwärzlich, Pronotum selten lebhaft metallisch. Körper lang oval, Pronotum an der Basis am breitesten. Vorderschienen schwach geknickt und undeutlich ausgeschnitten. Analsegment einfach.... 13.

13. Halsschild auch in der Mitte schön metallisch, ungefähr 60 Punkte im vierten Streif; sehr bunte Art von Sumatra..... **C. opulenta** Harold.

Halsschild in der Mitte schwärzlich, ungefähr 80 Punkte im vierten Streif, weniger bunte Art. (Ceylon, Indien, Japan, China, Sunda-Inseln, Philippinen, Celebes.) ..... **C. induta** Wiedemann.

Schmal, Decken deutlicher gefurcht, Zwischenräume kaum punktiert. Stammform Form und Skulptur der vorigen, Decken purpurfarben, selten mit breiter, goldigen Querbinde oder goldiger Naht. (Besonders Ceylon und Indien.) ..... **C. induta var. purpurina** var. nov.

Breiter, Decken mit Punktlinien, Zwischenräume kräftiger punktiert.
**C. induta** subsp. **subocellata** Castelnau und Brullé.

14. Oberseite leuchtend purpurviolett, selten in der Mitte mit Spur von Goldbinde ..... 15.

Oberseite stark metallisch oder düster schwarz, braun, blau, nicht purpurn ..... 16.

15. Breite, grosse Art, Zwischenräume vollkommen flach, Vorderschienen des Männchens gerade. (Formosa.)
**C. laticollis var. schenklingi** Gebien.

Schmale, kleine Art. Zwischenräume gewölbt, Vorderschienen geknickt. (Indien, Ceylon.) ..... **C. induta var. purpurina** var. nov.

16. Oberseite stark metallisch, Zwischenräume flach, Halsschild violett oder mit Goldflecken. Grosse Arten ..... 17.

Oberseite düster schwarz, braun, schwarzblau, Zwischenräume mehr oder minder gewölbt, Halsschild düster gefärbt. Kleinere, schmale Arten von der Gestalt der *C. induta* ..... 19.

17. Schulterbeule stark erhaben, Epipleuren prächtig violett, Stirn mit Längseindruck, Deckenspitze des Weibchens mit kurzem Schwänzchen, Halsschild mit zahlreichen Goldflecken. (Malacca.)
**C. caesarea sp. nov.**

Schulterbeule schwach, normal, Epipleuren schwarz, Stirn ohne Eindruck, Deckenspitze des Weibchens breit verrundet, Halsschild ohne Goldflecken ..... 18.

18. Flügeldecken leuchtend feurig rot, an jeder Seite vor der Mitte, hart über dem Seitenrand mit Eindruck. Punktlinien der Decken nicht eingeschnitten. (Philippinen.) ..... **C. pyritosa sp. nov.**

Flügeldecken düster metallisch, schwach goldig, an jeder Seite am Rande ohne Grübchen, Punktlinien der Decken fein eingeschnitten. (Sumatra.) ..... **C. medanensis sp. nov.**

19. Stirn mit Punktgrübchen, blauschwarze, schwach glänzende Art, Mittelschienen des Männchens fast gerade, ohne Ausschnitt vorn, Flügeldecken mässig gefurcht. (Buru, Amboina.) ..... **C. subnigra sp. nov.**

Stirn ohne Grübchen; Männchen, Vorder- und Mittelschienen kräftig geknickt und mit leichtem Ausschnitt vorn in der Mitte ..... 20.

20. Decken tief gefurcht, 10 Millimeter und grösser, Mittelschienen beim Männchen stark geknickt, mit kräftigem Ausschnitt im Knick. (Timor.) ..... **C. tristis Harold.**

Decken fein punktiert gestreift, Zwischenräume flach oder schwach gewölbt, Mittelschienen des Männchens schwächer geknickt und schwach ausgeschnitten ..... 21.

21. Körper schwarzbraun, glänzend, Zwischenräume der Decken flach, sehr fein aber deutlich punktiert, Fühler einfarbig rotbraun. (Saleyer, ex Fairmaire.) ..... **C. dolorosa Fairmaire.**

Körper hellbraun, matt, die mittleren Zwischenräume sehr stumpf gekielt, fast unpunktiert, Fühler rotbraun mit dunkler Basis der Glieder. (Philippinen.) ..... **C. mindorensis sp. nov.**

22. Flügeldecken nur mit rotem Schulterfleck. Breit oval, blau, Unterseite schwarz. (Amboina.) ..... **C. humeralis Harold.**

Flügeldecken mit vorderer querer Binde und einem Spitzenfleck, Unterseite rotbraun, schmälere, meist braune Arten ..... 23.

23. Oberseite blau, die vordere Binde geht über beide Decken ohne Unterbrechung bei der Naht. (Indien.) ..... **C. bifasciata Chevrolat.**

Oberseite braun, die vordere Binde ist durch die Naht unterbrochen.. 24.

24. Flügeldecken hinten tief gefurcht, der hintere Fleck ist länglich und beiden Decken gemeinsam, er nimmt die beiden inneren Zwischenräume ein, Mittelschienen des Männchens scharf gesägt. (Tenasserim.) ..... **C. serripes sp. nov.**

25. Kopf zwischen den Augen eingedrückt, der hintere Fleck berührt die Naht nicht, Fühlerglieder dreieckig. (Borneo, ex Fairmaire.)
**C. rufofasciata Fairmaire.**

Kopf zwischen den Augen nur mit Spur von Eindruck, hinterer Fleck an der Naht hinten mit dem Andern verbunden. Fühlerglieder stark quer. (Arraianküste.) ..... **C. vidua sp. nov.**

**Ceropria superba** Wiedemann. Tafel 1, Fig. 1 und 2.

*Ceropria superba* WIEDEMANN, Zool. Mag. (1823) 43; HAROLD, Stett. Ent. Zeitg. 38 (1877) 350; GEBIEN, Sarawak Mus. Journ. 2 (1914) 20, 21.

*Ceropria chrysostica* HOPE, Trans. Ent. Soc. London (1845) 16.

*Ceropria festiva* CASTELNAU und BRULLÉ, Ann. Sc. Nat. (1829) 400, t. 10, f. 4*a*, *b*.

*Ceropria paykulli* DALMAN, Anal. Entom. (1823) 60.

Sehr weit verbreitet: Unter-Burma, Moulmein. Malacca, Perak (*Grubauer*); Tenasserim (*Helfer*). Süd-China, Canton. Sumatra, Medan; Soekaranda (*Dohrn*). Mentawei, Si-Oban, April-August, 1894 (*Modigliani*). Java, ohne genauere Angaben. Borneo, Njabang; Kuching, November 1, 1899 (*Moulton*).

Es ist auffällig dass alle Beschreibungen, auch die Monographien von Castelnau und Brullé und Harold, wohl eingehend die charakteristische Zeichnung der Decken geben, und selbst auf Nebensächliches eingehen, dass sie aber im übrigen die wichtigen plastischen Merkmale vernachlässigen. Daher sind einige Ergänzungen nicht überflüssig. Eine Verwechslung kann nur mit der ähnlich gezeichneten folgenden Art eintreten. Auf die Unterschiede habe ich aufmerksam gemacht.[3]

Die Stirn, welche nach vorn stark verschmälert ist, ist dort merklich breiter als der Querdurchmesser eines Auges, vor diesen findet sich ein kräftiger Quereindruck. Die Fühler sind am Grunde sehr schlank, Glied 3 und 4 sind viel länger als breit, 5 und 6 so breit wie lang, die folgenden quer, 10 fast doppelt so breit wie lang, auch 11 ist quer. Die Glieder sind nicht gesägt, sondern die Lappen haben nach innen eine stark verrundete Spitze. Die Stirn ist in beiden Geschlechtern eingedrückt. Die Zeichnungen auf Pronotum und Flügeldecken sind schmale Goldbinden auf kupferbraunem Grunde. Die des Pronotums bestehen aus einem mittleren, länglichen Fleck und jederseits am Rande einer O-förmigen grossen Makel, die aber im Gegensatz zur nächsten Art nicht ganz geschlossen ist, sondern nach hinten offen. Ich glaube dieses Merkmal ist konstant, wenigstens habe ich bei den 28 mir vorliegenden Stücken keine Abweichung gefunden, bei *versicolor* dagegen ist das O geschlossen. Die Binden, auch die der Decken, sind verhältnismassig schmal und gut wenn auch nicht scharf begrenzt. Vorn befindet sich in der Mitte ein länglicher Fleck neben dem Schildchen, in der Mitte eine gezackte Querbinde, die vom Rande bis zum Nahtstreif läuft. An der Spitze findet sich im zweiten Zwischen-

[3] Sarawak Mus. Journ. 2 (1914) 21.

raume eine von der Spitzenecke bis zum letzten Viertel reichende Goldbinde, die nach aussen biegt und bis zum Rande geht, dieser quere Teil ist meist breiter. Die Binden der Decken variieren etwas. Die Spitze ist nicht abgeschnitten, sondern im Gegenteil schwach ausgezogen, einzeln verrundet, das äusserste Ende beim Weibchen etwas verdickt. Die Vordertarsen des Männchens sind kräftig verbreitert, die Mittelschienen in diesem Geschlecht leicht gekrümmt, nicht geknickt, gegen das Ende nicht breiter, leicht tuberkuliert.

Ceropria versicolor Castelnau und Brullé. Tafel 1, Fig. 3.

*Ceropria versicolor* Castelnau und Brullé, Ann. Sc. Nat. (1829) 401; Harold, Stett. Ent. Zeitg. 38 (1877) 351.

*Ceropria impressifrons* Fairmaire, Notes Leyd. Mus. 4 (1882) 222; Gebien, Sarawak Mus. Journ. 2 (1914) 21.

Mir liegen aus allen Sammlungen über 70 Tiere vor. Ceylon (*Nietner*). Ostindien. Siam (*Wallace*). Malacca, Perak; Tenasserim; Thagata, April, 1897 (*L. Fea*); Tenasserim; Meelam, April, 1887 (*Fea*). Pulo Penang. Sumatra, Manna (*Knappert*); Padang Pandjang; Deli (*L. Martin*); Soekaranda (*Dohrn*). Java, Semarang, Mai, 1906 (*Drescher*); Tjiamio, April, 1907 (*Drescher*); Boemi Ajoe. Borneo, Sarawak (*Wallace*); Südost Borneo (*Grabowsky*).

In der Zeichnung unterscheidet sich diese Art von der vorigen, mit welcher allein sie verwechselt werden kann, gut. Die beiden O-förmigen Binden an der Seite des Halsschildes sind geschlossen, nur bei einem einzigen der mir vorliegenden Tiere leicht unterbrochen. Die Spitzenmakel ist ganz anders und besteht aus zwei langen, goldigen Längswischen, einem am Aussenrand und einem an der Naht bis zur Spitze, eine Querverbindung beider weit vor der Spitze, wie sie bei voriger Art vorhanden ist, fehlt. Das wichtigste plastische Merkmal besteht in der Bildung der Deckenspitzen. Diese sind in beiden Geschlechtern breit abgestutzt oder breit lappenförmig verrundet, beim Weibchen sind die Spitzen kräftig gemeinsam niedergezogen, beim Männchen findet sich ein kleiner, nicht eben deutlicher Ausschnitt an der Aussenseite der Epipleuren unmittelbar vor der Spitze. Ferner ist beim Weibchen das Analsegment jederseits gefurcht und mit kurzer Spitze versehen. Das ist wieder ein Beispiel dafür, dass auch bei den Weibchen von Tenebrioniden positive Geschlechtsmerkmale vorkommen. Sehr auffällig ist für diese Art für *superba* und *erythrocnema* die Bildung des Abdomens beim Männchen; der gewaltige Geschlechtsapparat braucht grosse Bewegungsfreiheit, die Analklappe muss weit

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geöffnet werden, die Chitinringe des dritten und vierten Segmentes sind daher stark verschmälert und dementsprechend die Gelenkhäute bis auf die halbe Segmentbreite vergrössert. Dieses von allen Autoren bisher übersehene Merkmal kommt nur den drei erwähnten Arten zu.

**Ceropria erythrocnema** Castelnau und Brullé.

*Ceropria erythrocnema* CASTELNAU und BRULLÉ (*erythroctena* err. typ.) Ann. Sc. Nat. (1829) 402; HAROLD, Deutsche Ent. Zeitschr. 22 (1878) 350.

*Ceropria femorata* MOTSCHULSKY, Bull. Soc. Imp. Nat. Mosc. 46 (1872) 476.

Nach Motschulsky's Beschreibung kann wohl kaum ein Zweifel sein, dass *femorata* etwas anderes ist als *erythrocnema*, die er nicht kennt, sie nicht einmal erwähnt.

Die Art scheint selten zu sein. Mir liegen nur 8 Tiere vor, davon 5 aus meiner Sammlung.

Borneo, Sandakan (*Baker*). Java, ohne genauere Angabe. Sumatra, Padang Pandjang; Manna (*Knappert*).

In den Sammlungen Berlin, München, Hamburg, und Gebien.

Diese Art bildet mit den beiden vorigen zusammen eine besondere Gruppe, ausgezeichnet durch die eigentümliche Abdominalbildung des Männchens, die ich bei der vorigen Art genauer beschrieben habe. Sie ist an der Färbung leicht zu erkennen, denn sie ist die einzige indo-malayische Art mit roten Schenkeln, überhaupt die einzige bisher bekannte mit diesen Merkmal. Doch besitze ich 2 neue afrikanische rotschenkelige Arten. Die Flügeldecken sind einfarbig kupferbraun, bei Ansicht gegen das Licht etwas goldig, Zeichnungen und Makeln fehlen. Die Stirn ist eingedrückt, in beiden Geschlechtern nur wenig breiter als ein Auge im Querdurchmesser. Das Epistom ist gerade abgeschnitten, sehr breit, und hat deutliche Aussenecken, die Fühlerglieder sind kräftig erweitert, dreieckig, auch die vorletzten sind kaum quer. Der Halsschild ist goldig und hat jederseits einen erloschenen, kupferbraunen Fleck. Die Spitzen der Decken sind nicht abgeschnitten oder verrundet. Jede leicht vorgezogene, gut ausgeprägte Spitze ist mit einem Knötchen versehen, beim Weibchen leicht heruntergezogen. Die Vordertarsen des Männchens sind kräftig erweitert, die Vorderschienen nicht geknickt, die Mittelschienen lang und dünn, ganz leicht S-förmig geschwungen, ohne Zähnchen oder Körnchen innen. Das Analsegment des Weibchens hat jederseits eine feine Randfurche und

wird oft, wie bei den verwandten Arten, einwärts gekrümmt getragen.

**Ceropria speciosissima** Gebien.

*Ceropria speciosissima* GEBIEN, Sarawak Mus. Journ. 2 (1914) 19.

Von dieser herrlich gefärbten Art liegen mir jetzt 2 Weibchen vor. Sie ist an der weitläufigen Punktierung der Decken zu erkennen; die Punkte stehen in Linien, nicht in Furchen, im vierten Streif sind nur circa 33 Punkte vorhanden, bei andern Arten mehr als das doppelte bis 120 Punkte. Ich möchte annehmen dass das Männchen geknickte Vorderschienen hat und verbreiterte Mittel- und Hinterschienen. Da die Beschreibung ausführlich ist, verzichte ich auf eine Wiederholung.

Borneo, Limbang, April, 1910 (*Moulton*). Sumatra, Soekaranda (*Dohrn*).

In den Sammlungen Stettin und Gebien.

**Ceropria decolorata** sp. nov.

Breiter als *C. induta*. Unterseite und Beine schwarz. Vorderkörper sehr dunkel, aber bunt metallisch, Flügeldecken schwärzlich kupfrig, Schulter und Spitzen ebenso gefärbt, der Fleck von einem sehr zarten, regenbogenfarbenen Rand umflossen.

Der Kopf ist stark quer, die Augen quellen stark aus der Wölbung des Kopfes, die Stirn ist vorn zwischen ihnen ungefähr halb so breit wie der Querdurchmesser eines Auges, sie ist gewölbt, eine Längsfurche fehlt, die Clypealsutur, die Vorderecken des Auges miteinander verbindend, ist tief eingedrückt. Die Wangen verengen sich fast geradlinig nach vorn, das Epistom ist so lang wie die Stirn vorn zwischen den Augen, es ist gerade abgestutzt, seine Ecken sind zwar stumpf aber deutlich. Die Punktierung ist äusserst fein. Die Fühler sind lang und stark gesägt, die Glieder vom vierten an dreieckig, so lang wie an der Spitze breit, die Ecken scharf.

Der Halsschild ist in der Mittellinie kaum mehr als halb so lang wie an der Basis breit. Die Färbung ist schwärzlich metallisch mit einigen schwachen, purpurnen Längsflecken. Die Basaleindrücke sind tief, länglich grübchenförmig, die Basis ist hinter den Eindrücken und daneben leicht aufgebogen, wodurch sie fast gerandet erscheint. Die Spitze ist in der Mitte gerade, die Vorderecken treten sehr breit und kräftig vor, sind aber in

der Randkante breit verrundet. Die basale Hälfte des Pronotums ist parallelseitig, die Hinterecken sind daher ziemlich scharf rechtwinklig. Die Punktierung ist sehr fein, vorn erloschen, bei den Eindrücken etwas deutlicher.

Die Flügeldecken sind verhältnismässig breit, kräftig gewölbt, der Seitenrand ist von oben gerade noch vollständig sichtbar. Die Färbung ist viel schwächer als bei anderen Arten. Es findet sich je ein grosser Humeral- und Apikalfleck von der Grundfärbung der Decken (schwärzlich kupfrig); diese Flecken werden nur wegen ihres schmalen, farbigen Randes deutlich (von innen nach aussen; schwach goldig, grünlich, blau, purpurrot), so entsteht über die Mitte der Scheibe eine ziemlich schmale, durch die erwähnten Ränder eingefasste Binde. Die bunten Ränder reichen bis zum Nahtstreifen. Die Punktlinien liegen auf volkommen flachem Grunde, ihre Punkte stehen weitläufig (circa 36) im vierten Streif. Die Spitzen sind gemeinsam breit verrundet, von der Seite gesehen nicht herabgezogen, der Nahtstreif ist dort leicht vertieft.

Das Prosternum ist vorn kräftig gekielt, zwischen und hinter den Hüften gerandet, wagerecht. Die Ecken des Mesosternums treten vor. Das Abdomen des Männchens hat nur die normale, schmale Gelenkhaut, alle Schenkel sind dick, sparsam, kurz, gelb beborstet. Die Vorder- und Mittelschienen des Männchens sind stark geknickt, die vorderen in der Endhälfte innen leicht tuberkuliert, die mittleren etwas schwächer. Die Vordertarsen sind kräftig verbreitert, die Hinterschienen sind dünn, am Ende oben mit kleinem Eindruck, an den Hintertarsen ist Glied 1 so lang wie der Rest.

Länge, 10.5 Millimeter; Breite, 5.4.

Ein Männchen aus dem indo-malayischen Gebiet ohne genauere Angaben; in meiner Sammlung.

Trotzdem ich den genauen Fundort dieser Art nicht weiss, beschreibe ich sie doch unbedenklich, da sie nicht zu verkennen ist; nur sie und die vorige Art haben so weitläufige Punkte (weniger als 40 im vierten Streif). Sie ist von ihr, die in den herrlichsten Farben prangt, durch auf den ersten Blick fast einfarbig kupfrig schwärzliche Oberseite zu unterscheiden, hat viel schmälere Hinterschienen, und eine bei den Grübchen deutlich aufgebogene Halsschildbasis. In der Färbung der Decken sieht ihr *C. amplipennis* ähnlich, hat aber einen violetten Halsschild und enge Punktierung der Streifen.

**Ceropria formosana** Gebien.

*Ceropria formosana* GEBIEN, Arch. Nat. 79 1913 (1914) Abt. A, Heft 9, 20.

Ueber diese Art und die ihr nahe verwandte *C. sulcifrons* habe ich an anderen Ort ausführlich berichtet. Neues Material liegt mir nicht vor.

Formosa.

**Ceropria sulcifrons** Harold.

*Ceropria sulcifrons* HAROLD, Stett. Ent. Zeitg. 37 (1877) 353; LEWIS, Ann. & Mag. Nat. Hist. VI 13 (1894) 399.

Ueber Diese Art haben Harold, Lewis, und ich berichtet. Die Typen des Museums Berlin, die mir jetzt vorliegen, zeigen aber eine falsche Auffassung der Art; es sind mit ihnen 3 Exemplare der *C. induta* vermischt. Ich glaube nicht dass das Versehen auf Harold zurückzuführen ist, der beide Arten wohl zu trennen weiss. Die betreffende Stücke der *induta* stammen ebenfalls aus Japan und diesen Fundort (Japan, *Hilgendorf*) führt er ausdrücklich bei *induta* an, aber unter den zahlreichen Exemplaren dieser Art im Museum Berlin fehlen japanische Stücke ausser den eben genannten dreien. Ich vermute also dass diese später versehentlich zu *sulcifrons* gesteckt wurden, mit der *induta* flüchtige Aehnlickkeit hat. *Ceropria sulcifrons* ist viel lebhafter gefärbt, hat einen stark metallischen Halsschild mit Kupferflecken, eine eingedrückte Stirn, ist wesentlich grösser, und hat viel gröbere, weitläufigere Punkte der Decken.

Nur aus Japan bekannt.

**Ceropria amplipennis** sp. nov. Tafel 1, Fig. 4 und 5.

Sehr breit oval, flach. Unterseite schwarz, Kopf metallisch, Halsschild blaugrün oder violett mit goldigen oder goldgrünen Seiten. Flügeldecken bei flüchtigem Anblick einfarbig, düster braun-bronze, da Schulter- und Apikalfleck nicht durch andere Färbung abgehoben sind, beide durch schmale, irisierende Bänder begrenzt.

Der Kopf hat eine kräftig gebogene Stirn, auf der sich nur die Spur eines Eindrucks zeigt, sie ist vorn sehr schmal, weniger als halb so breit wie der Querdurchmesser eines Auges. Das Epistom ist deutlich etwas länger als die Stirn vorn und von ihr durch eine gebogene, stark eingedrückte Linie abgesetzt.

Am Innenwinkel der Augen zeigt sich eine sehr feine aber scharfe Augenfurche hart am Augenrand. Die Ecken des Epistoms sind breit verrundet, die Punktierung ist ausserordentlich fein, wenig dicht, regelmässig. Die Fühler sind vom vierten Gliede an gesägt, dieses ist etwas länger als breit, innen nicht scharfecking, die andern Glieder sind scharf dreieckig, so breit wie lang.

Der Halsschild ist kaum doppelt so breit wie in der Mittellinie lang, die Spitze ist ganz leicht ausgeschnitten, die Ecken treten undeutlich, ganz gerundet vor, die grösste Breite liegt bei den Hinterecken, zuerst sind die Seiten schwach verengt, von der Mitte an stark. Die Wölbung ist stark, die basalen Eindrücke sind tief, länglich. Die Punktierung ist sehr fein, weitläufig.

Die sehr breiten Flügeldecken sind flach gewölbt, die Seiten fallen recht schräge ab, daher ist die Seitenrandkante breit sichtbar. Die Färbung ist, wie oben beschrieben, wenig auffällig, die irisierenden Ränder der Flecken sind sehr schmal, die Flecken gross. Die Zwischenräume sind ganz flach, nur an der Spitze sind einige Streifen, besonders der Nahtstreif, mehr vertieft. Bei flüchtiger Betrachtung erscheinen die Punktstreifen als eingeschnittene Linien, da die Punkte so dicht stehen (über 100 im vierten Streifen) dass sie vertieft zu sein scheinen. Die äusserst feine und weitläufige Punktierung der Zwischenräume ist nur bei starker Vergrösserung sichtbar. Die Spitzen sind gemeinsam verrundet, die äusserste Ecke ist im Nahtstreif leicht längsverdickt.

Das Prosternum ist wagerecht, zwischen den Hüften undeutlich gefurcht, vorn kaum gesenkt und scharfeckig über dem Hals erhaben. Die Mittelbrust ist breit U-förmig ausgeschnitten, die Ecken sind verrundet. Das Abdomen ist deutlich längsstrigos, das Analsegment an der Spitze schwach ausgerandet und angedrückt. Die Beine sind lang und sehr plump. Die Schenkel sind beim Männchen nicht deutlich gekrümmt, die Vorderschienen sind geknickt, in der Endhälfte verbreitert und dort mit 3 oder 4 Körnern versehen. Die Mittelschienen sind innen schon vor der Mitte gebogen, dann verbreitert, und in der Verbreiterung an der Vorderseite mit feiner Kante versehen, aber nicht deutlich tuberkuliert. Auch die geraden Hinterschienen sind verhältnismässig plump, gegen das Ende schwach dicker werdend, sie haben aussen an der Spitze einen flachen Eindruck in welchen die aufwärts geschlagene Tarse passt. Die Vorderfüsse sind kräftig verbreitert.

Länge, 11.9 bis 12.3 Millimeter; Breite, 6.2.

Zwei Weibchen von Sumatra, Medan; in meiner Sammlung.

Diese grosse, breite Art hat einen näheren Verwandten in *C. opulenta*, die aber viel schöner gefärbt ist, nur das Pronotum ist bei unserer Art ähnlich bunt, die Punkte der Streifen stehen sehr dicht (bei *opulenta* nur circa 60 Punkte im vierten Streif) an den dicken Hinterschienen der Männchen findet sich ein Eindruck, der bei Harold's Art fehlt. Der Eindruck findet sich nur bei wenigen Arten. Ich finde ihn bei *C. formosana, sulcifrons, decolorata, amplipennis, pyritosa,* und *medanensis*. Am nächsten steht unsere Art der *C. formosana,* bei welcher ebenfalls die Punkte der Streifen sehr dicht stehen, aber die Art von Formosa ist sehr lebhalt gefärbt, der Halsschild dagegen düster, die Zwischenräume sind kräftig gewölbt, die Stirn ist gefurcht, die Fühlerglieder sind deutlich quer.

**Ceropria medanensis sp. nov.**

Breit oval, Hinterkörper gewölbt, die Seiten fallen nicht senkrecht ab, die Unterseite ist bis auf die meist deutlich metallischen Epipleuren schwarz, die ganze Oberseite bunt. Kopf kräftig metallisch, meist goldig, Halsschild leuchtend purpurblau oder violett oder purpurn, Flügeldecken ohne bunte Makeln an Schultern und Spitze, goldig braun erzfarben, die Punktstreifen meist sehr schmal purpurn, der Rand sehr schmal, aber gut abgehoben blau.

Der Kopf hat auf der Stirn keinen Eindruck, diese ist vorn sehr schmal, nicht breiter als das dritte Fühlerglied lang, schmäler als der Vorderkopf vor den Augen, von ihm durch eine scharfe, eingedrückte Furche abgesetzt. Die Punktierung ist sehr fein, hinten auf der Stirn kaum deutlicher. Die Fühler sind vom vierten Gliede an gesägt, beim Weibchen ist das vierte Glied ebenfalls deutlich quer, die folgenden stärker, scharf dreieckig, beim Männchen ist Glied 4 so breit wie lang, die folgenden nicht so stark quer.

Der Halsschild ist doppelt so breit wie lang, die Basaleindrücke sind kräftig, die Punktierung ist zwar sehr fein, aber doch deutlich und ziemlich gleichmässig, die Verengung geschieht schon von der Basis an, ist aber zuerst unauffällig, die Vorderecken sind ganz verrundet und treten von oben gesehen schwach vor.

Auf den Flügeldecken fehlen die queren Flecken oder farbigen Binden. Der Rand ist von oben breit sichtbar. Die Zwischenräume sind vollkommen flach und nur bei starker Vergrösserung sichtbar punktiert. Die Linien haben dicht gedrängt stehende

Punkte (über 100 im vierten Streif), die so dicht stehen dass scheinbar eingeschnittene Linien vorhanden sind. Unterseite und Beine wie bei voriger Art.

Länge, 11 bis 12 Millimeter; Breite, 6.1 bis 6.3.

Zwei Männchen und 3 Weibchen in meiner Sammlung; ein weiteres Männchen in der Sammlung Veth.

Sumatra. Medan; Padang Pandjang; Manna (*Knappert*).

Diese Art stimmt in allen wesentlichen Merkmalen mit *C. amplipennis* überein, ist aber sofort durch die Färbung zu unterscheiden. Einfarbig metallische Flügeldecken sind in der Gattung sehr selten, sie finden sich ausser bei unserer Art bei *C. erythrocnema* und *caesarea*. Die erstere gehört aber einer ganz andern Gruppe an, ausgezeichnet durch die eigentümliche Bildung des männlichen Abdomens, breite gefurchte Stirn, rote Schenkel, nicht scharf gesägte Fühler. Die *C. caesarea* hat starke Schulterbeulen, in Schwänzchen ausgezogene Deckenspitzen, goldig gefleckten Halsschild. *Ceropria amplipennis*, die nächst verwandte Art, hat nicht nur ganz andere Färbung, sondern auch etwas breitere Stirn und nicht quere Fühlerglieder.

**Ceropria pyritosa sp. nov.**

Gross, breit, und ziemlich flach; Vorderkörper dunkelblau, der Halsschild in der Mitte zuweilen mit einigen undeutlichen Purpurflecken; Flügeldecken herrlich goldig und feuerrot, Naht blaugrün, Schulter und Spitze prachtvoll feurig goldig, doch fehlen irisierende Ränder der Flecke.

Der Kopf ist breit, die Stirn von vorn nach hinten gleichmässig gewölbt, ohne Spur eines Eindrucks, Augenfalten fehlen. Die Breite der Stirn vorn ist geringer als die halbe Breite eines Auges, die Wangen sind kräftig aufgebogen. Die Fühler sind vom vierten Gliede an scharf gesägt, beim Männchen sind die Glieder so breit wie lang, beim Weibchen quer.

Der Halsschild ist an der Basis doppelt so breit wie in der Mittellinie lang, die Seiten sind in der Endhälfte parallel, die Hinterecken scharf stumpfwinklig, die vorderen verrundet und schwach vorragend. Die Spitzenrandung ist sehr fein und vollständig, die basalen Grübchen sind stark. Die Punktierung ist ausserordentlich fein; dem schwach bewaffneten Auge erscheint die Oberfläche glatt.

Die Flügeldecken haben kräftige Schulterbeulen, sie sind hinter der Mitte am breitesten; der Seitenrand ist von oben ganz sichtbar. Vor der Mitte findet sich über dem Seitenrand, die beiden äusseren Zwischenräume einnehmend, ein flaches Grüb-

chen. Die Spitzen sind in beiden Geschlechtern normal. Die oben beschriebene Färbung ist nicht abgegrenzt, es fehlen auch irisierende Querlinien. Die Punktlinien sind sehr oberflächlich und zart, nicht eingeschnitten, die Punkte stehen sehr dicht, circa 100 im vierten Streifen. Die kaum sichtbar punktierten Zwischenräume sind vollkommen flach.

Das Prosternum ist nach vorn schwach und gleichmässig gesenkt, stumpf gekielt, zwischen den Hüften fein doppelfurchig, die Propleuren sind glatt. Das Mesosternum ist breit U-förmig ausgeschnitten, das Metasternum der Länge nach flach gefurcht. Die beiden vorletzten Abdominalsegmente sind beim Männchen normal breit; das Analsegment ist in diesem Geschlecht mit flacher, grosser Grube versehen, beim Weibchen mit undeutlichem Eindruck. Die Beine sind ganz schwarz. Die Vorder- und Mittelschienen des Männchens sind geknickt, die vorderen in der Mitte mit leichtem und sehr langem Ausschnitt versehen, darunter mit einigen feinen Körnchen an der Innenseite. Die Mittelschienen haben in der Mitte einen Ausschnitt von etwa einem Viertelkreisbogen (bei Ansicht schräg von hinten deutlich!), am etwas verbreiterten Ende fehlen aber Körnchen. Die Hinterschienen haben beim Männchen an der Oberseite des Endes einen sehr deutlichen Eindruck. Die Vordertarsen sind mässig stark verbreitert, die mittleren nicht; an den Hintertarsen ist Glied 1 deutlich kürzer als der Rest.

Länge, 9.3 bis 11.1 Millimeter; Breite, 5 bis 5.8.

Ein Männchen und 3 Weibchen von den Philippinen. Mindanao, Iligan, und von derselben Insel, Kolambugan (*Baker*).

Diese herrliche Art hat flüchtige Aehnlichkeit mit der auf den Philippinen häufigen Unterart *subocellata* von *induta*, ist aber viel schöner gefärbt, ihr fehlen die irisierenden Ränder an Schulter und Spitze, Kopf und Halsschild sind stark blau; an den Seiten der Decken findet sich vor der Mitte ein rundlicher Eindruck, die Fühlerglieder sind scharf dreieckig, und das Männchen hat den charakteristischen Eindruck am Ende der Hinterschienen. Dieses letztere Merkmal kommt nur einer kleinen Gruppe von Arten zu: der obigen Art, *sulcifrons, formosana, amplipennis, decolorata,* und *medanensis,* von denen aber die vier ersteren Arten irisierende Binden haben; ausserdem haben *sulcifrons* und *formosana* eine Stirngrube, *amplipennis* hat fein eingeschnittene Punktlinien und keine Gruben an den Seiten der Decken, *decolorata* hat nicht nur andere Färbung, sondern auch grobe, weitläufige Punkte der Decken. *Ceropria medanensis* scheint unserer Art am nächsten zu stehen, ist aber viel düsterer

gefärbt, hat fein eingeschnittene Punktlinien und keine Grübchen an den Seiten der Decken.

Ceropria mindanaica sp. nov. Tafel 1, Fig. 6.

Sehr breit, Oberseite sehr bunt, herrlich gefärbt, Kopf blaugrün, Halsschild leuchtend goldig, an den Seiten feurig rot, Flügeldecken mit irisierenden Kreisen um die rotkupfrigen Schulter- und Spitzenflecken.

Kopf breit, Stirn ohne Grube, vorn zwischen den Augen schmäler als das Epistom von der Querfurche bis zum Vorderrand breit, so breit wie Glied 2 und 3 der Fühler zusammen lang. Die Querfurche ist sehr tief. Fühler stark gesägt, Glied 4 länger als breit, vom fünften an sind die Glieder scharf dreieckig, so breit wie lang, das letzte hat an der Vorderkante einen stumpfen Winkel, entsprechend der Spitze der andern Glieder. Die Punktierung ist äusserst fein, besonders auf dem Epistom.

Der Halsschild ist über doppelt so breit wie in der Mittellinie lang; die grösste Breite liegt in der Mitte, nach hinten hin sind die Seiten schwach aber deutlich verengt; die Verengung nach vorn ist sehr stark, die basalen Grübchen sind tief. Die Vorderecken ragen kurz lappenförmig vor. Die Färbung ist herrlich goldig, an den Seiten feurig kupfrig, die Punktierung scharf, aber sehr fein.

Die Flügeldecken sind nach dem Schema von *induta* und *opulenta* gefärbt, aber viel schöner als bei der ersteren. Schulter und Spitze sind dunkel rotkupfrig, die Naht ist golden. Die zwischen den beiden Flecken entstehende Binde ist viel schmäler als bei *induta*, leuchtend kupfrig rot. Der Seitenrand der Decken ist von oben breit sichtbar, die grösste Breite liegt im letzten Drittel. Die Linien von Punkten sind fein, einfach, nicht eingedrückt, die Punkte mässig gross, circa 65 stehen im vierten Streifen, verlieren sich aber an der Spitze. Die Zwischenräume sind vollkommen flach, nur direkt an der Spitze kräftig gewölbt, die Spitze selbst ist einfach.

Die Unterseite ist nackt, das Prosternum ist von den Hüften an wagerecht, nur fein rauh, vorn stark abschüssig und dem Hals eckig aufliegend, die Spitze ist prononziert. Das Mesosternum ist gerundet tief eingedrückt, seine Ecken sind nicht scharf. Das Abdomen ist am Ende abgeschnitten und kräftig, aber nicht scharfkantig eingedrückt. Die Schenkel sind schwarz, die Vorderschienen des Männchens sind stark geknickt, in der Mitte mit kräftigem bogigen Ausschnitt versehen, darunter scharf tuberkuliert. Die Mittelschienen sind schwächer geknickt, leicht ausgeschnitten, unter dem Ausschnitt mit fein krenulierter

Kante versehen, innen am Ende mit scharfer Ecke. Die Vordertarsen der Männchen sind stark verbreitert, die Hinterschienen haben in diesem Geschlecht am Ende keinen Eindruck. An den Hintertarsen ist Glied 1 etwas kürzer als der Rest.

Länge, 10.6 Millimeter; Breite, 5.7.

Ein Männchen von den Philippinen, Mindanao, Iligan (*Baker*).

Diese wundervoll gefärbte Art übertrifft noch die *C. opulenta* Harold, neben welche sie zu stellen ist, sie ist aber etwas grösser, breiter, der Halsschild ist nicht an den Hinterecken, sondern in der Mitte am breitesten, der Kopf ist blau, die Stirn des Männchens etwas breiter. Die Punkte der Streifen sind zwar nicht zahlreicher, aber kleiner und an der Spitze fast erloschen, dort sind auch die Zwischenräume gewölbt, bei *opulenta* dagegen fast flach. Die Vorderschienen des Männchens sind stark geknickt und in der Mitte ausgerandet, bei Harold's Art dagegen mit schwachem Ausschnitt versehen und schwach geknickt. Ferner ist das Analsegment am Ende abgestutzt und eingedrückt, bei *opulenta* dagegen einfach.

**Ceropria laticollis** Fairmaire.

*Ceropria laticollis* FAIRMAIRE, Ann. Soc. Ent. Belg. 47 (1903) 13.

Diese Art hat Fruhstorfer in grosser Zahl aus Tonkin und Annam mitgebracht. Von ihm hat sie der Autor erhalten, und aus derselben Quelle ist sie in viele Sammlungen gekommen (zum Beispiel, Berlin, München, und Gebien).

Fairmaire gibt zwar an anderen Ort eine ausführliche Beschreibung, doch fehlt gerade das Merkmal das sie sicher von *C. induta* respektiv *subocellata* scheidet; das ist die Bildung der Beine beim Männchen. Während nämlich bei *induta* und seiner Unterart die Vorder- und Mittelschienen geknickt und kräftig tuberkuliert sind, sind sie bei *laticollis* fast gerade und haben nur Spuren von Körnern an der Innenkante, auch sind die Schienen, besonders die mittleren, wesentlich dicker. Die Zwischenräume der Decken sind fast immer ganz flach und nur bei einigen Stücken meiner Sammlung von Sikkim deutlich gewölbt. Die Art gehört zu den grösseren der Gattung (10.5 bis 13.5 Millimeter) und ist breit oval.

Tonkin, Mount Mauson, April-Mai, 2,000 bis 3,000 Fuss (*Fruhstorfer*). Annam, Pha-Rang; Phuc-Son, November-Dezember (*Fruhstorfer*). Sikkim, Abor-Land, Rotung, 1,400 Fuss, 23ter Dezember, 1911 (*Kemp*). Burma, Carin Ghecu, 1,300

bis 1,400 Meter, Februar-März, 1888 (*Fea*); Carin Chebà, Mai-Dezember, 1888, 900 bis 1,100 Meter (*Fea*).

**Ceropria laticollis** Fairmaire subsp. **schenklingi** Gebien.

*Ceropria laticollis* Fairmaire subsp. *schenklingi* Gebien, Arch. Naturg. 79 1913 (1914) Abt. A, Heft 9, 19.

Diese Form steht in einem ähnlichen Verhältnis zu *laticollis* wie *purpurina* zu *induta*. Auf Formosa scheint nur *schenklingi*, aber nicht die Stammart vorzukommen. Sonst liegt mir nur ein Exemplar der Form von Abor-Land, Puging, 3,000 Fuss, Februar, 1912 (*Kemp*) vor.

Bei *schenklingi* sind die Flügeldecken einfarbig violett. Die wesentlich breiteren Vordertarsen der Männchen berechtigen aber vielleicht doch diese Form als eigene Art aufzufassen.

**Ceropria induta** Wiedemann.

*Ceropria induta* Wiedemann, Germ. Mag. Ent. (1821) 164; Castelnau und Brullé, Ann. Sc. Natur. (1829) 399; Harold, Stett. Ent. Zeitg. 38 (1877) 351.

Dieses ist die gemeinste indo-malayische Art, in allen Sammlungen vorhanden, und sehr weit verbreitet; mir liegen gegenwärtig über 300 Exemplare vor. Zugleich ist diese Art auch leider ziemlich veränderlich und am schwersten gegen nahe verwandte Arten abzugrenzen (*dolorosa, subocellata, mindorense, laticollis*). Ich habe vergeblich versucht *induta* von *subocellata* scharf zu trennen. Obgleich mir ein reiches Material (darunter das von Harold bearbeitete und die Typen von Wiedemann, die ehemalige Sammlung Haag), ferner die einschlüssige Litteratur vollständig zur Verfügung steht, ist es mir nicht gelungen die beiden, bisher als gut getrennt angesehenen Formen, artlich zu trennen. Das Resultat meiner Untersuchungen ist folgendes:

1. Wiedemann hat offenbar beide Arten bei der Abfassung der Beschreibung vor sich gehabt. Die Typen seiner eigenen Sammlung im Museum Hamburg gehören der Form an welche Harold, und offenbar auch Castelnau und Brullé, als *subocellata* aufführen. Ein weiteres Exemplar des Berliner Museums, ebenfalls mit der Bezeichnung "type" versehen (ex Coll. Westermann), is die "echte" *induta* der Autoren. Da also Wiedemann eine Mischart aufstellte, liegt kein Grund vor die gangbare Nomenklatur zu ändern.

2. Castelnau und Brullé haben, wie schon Harold ausführt, unter *induta* Wiedemann möglicherweise irgend eine andere Art

verstanden. Aber ihre Beschreibung widerspricht doch nicht geradzu der Deutung auf *induta* Wiedemann im Sinne Harold's.

3. Harold bezeichnet im Museum Berlin eine Anzahl Exemplare von Java als *subocellata*, Tiere die sich durch etwas breiteren Körper, bedeutendere Grösse, ganz flache Zwischenräume mit deutlicher Punktierung von *induta* typ. unterscheiden. Auf diese Stücke passt tatsächlich die Beschreibung von Castelnau und Brullé. Ich habe also keinen Grund an dem Resultat der Untersuchungen Harold's etwas zu ändern.

4. Lewis [4] gibt ebenfalls eine Auffassung der *induta* im Gegensatz zu *subocellata*. Aber während Harold die Unterschiede zwischen beiden Arten in Grösse und Skulptur der Decken sucht, findet Lewis ausser in Gestalt und Grösse den wichtigsten Unterschied in der Bildung der männlichen Tarsen und Schienen. Er sagt die Vordertarsen seien kaum erweitert und die Vorder- und Mittelschienen kaum "dentate," ich würde sagen "gekörnt." Aus diesen Angaben und der Bemerkung über die Grösse scheint mir hervorzugehen dass Lewis nicht die *subocellata* der andern Autoren vor sich hatte, sondern eine andere Art. Leider liegt mir sein Material nicht vor, aber seine Angabe, dass er die Art aus der Sammlung Bates von vielen Fundorten vor sich hatte, beweist dass es sich nicht um eine rein japanische Form handeln kann, sondern um eine weiter verbreitete. Ich bin der Meinung dass er Tiere der Art vor sich hatte welche Fairmaire später als *C. laticollis* von Tonkin beschrieb. Leider liess ich mich bei der Bearbeitung der Formosafauna durch Lewis verleiten *laticollis* als *subocellata* aufzufassen, muss aber jetzt meine Meinung ändern.

5. Meine Auffassung: Mir liegt von Java, dem Originalfundort sowohl von *induta* als auch von *subocellata*, ein reiches Material aus den verschiedensten Sammlungen vor. Es zeigt sich dass beide Formen nicht artlich getrennt werden können. Grössere, breitere Tiere, mit flachen, kräftig punktierten Zwischenräumen, eben die *subocellata* der Autoren, zeigen in allen den genannten Merkmalen Uebergänge zu *induta*. Die Form wird allmählich schmäler, die Zwischenräume nach und nach gewölbter, und deren Punktierung wechselt sehr, ist oft sehr deutlich bei gewölbten Zwischenräumen und dann wieder sehr fein bei flachen, ebenso umgekehrt. Aehnliche Beobachtungen mache ich an dem Material von den Philippinen. Dagegen würde ich die weit über

[4] Ann. & Mag. Nat. Hist. VI 13 (1894) 399.

100 Exemplare von Formosa, die ich gegenwärtig in Händen habe, sämtlich zu *induta* im engeren Sinne stellen, sie zeigen alle die schmale Form, geringe Grösse, die geknickten, deutlich tuberkulierten Mittelschienen der Männchen; aber auch bei diesen Tieren wechselt die Wölbung der Interstitien und deren Punktierung. Wie schwer die Frage zu entscheiden ist mag daraus hervorgehen, dass Harold ein Paar Tiere aus der Sammlung Haag, die von seinen Berliner Exemplaren der *subocellata* garnicht zu unterscheiden sind, zu *induta* stellt; und umgekehrt steckt dort ein Tier bei *subocellata*, das sicher besser bei *induta* aufgehoben wäre.

Ich meine also die beiden Formen sind artlich nicht zu trennen. Man mag *subocellata* als Rasse der *induta* auffassen, gekennzeichnet durch ovalen Körperumriss und kräftige Punktierung der flachen Zwischenräume. Auch die Untersuchung der Genitalien bewies die Uebereinstimmung.

Die Art ist ungemein weit verbreitet.

### FUNDORTE FÜR DIE STAMMFORM

Da ich nicht weiss ob alle Verfasser die inbetracht kommenden Formen richtig getrennt haben, gebe ich nur die Fundorte der Stücke die mir gegenwärtig vorliegen:

Ceylon (*Nietner*); Nalanda (*Horn*); Putalam (*Horn*); Maskebjea (*Horn*); Anaradhapura (*Horn*). Andamanen (*Roepstorff*). Burma, Amherst Distrikt, Kawgareik, 19ten November, 1911 (*Graveley*); Bhamo, Juli, 1886 (*Fea*); Pegu, August bis Dezember, 1887 (*Fea*); Shwegoo Myo, Oktober, 1885 (*Fea*); Catcin Cauri, August bis November, 1886 (*Fea*); Carin Chebà, 900 bis 1,100 Meter, Mai, 1888 (*Fea*); Palu (Pegu), August bis September, 1887 (*Fea*). Malacca, Perak (*Grubauer*); Tenasserim, Malewoon, Juli bis August, 1887 (*Fea*); Loeb Alai (*Grubauer*); Lialang (*Grubauer*); Singapore. Annam, Phuc-Son, November bis Dezember (*Fruhstorfer*). Insel Hainan, 10ten bis 25ten März, 1909 (*Schoede*). Insel Formosa, in grosser Zahl von zahlreichen Fundorten (*Sauter*). Japan, Nagasaki (*Hilgendorf*). Die Stücke stecken im Museum Berlin unter den Typen von *C. sulcifrons*. Sumatra, Ajer Mantcior, August, 1878 (*Beccari*); Sungei-Bulu, September, 1878 (*Beccari*); Padang, März, 1886 (*Modigliani*); Tebing-tinggi, 15ten bis 17ten August, 1884; 8ten, 11ten, 20ten Oktober, 1884; 2te Januar, 1885 (*Schultheiss*); Peinan (*v. Faber*); Residentschaft Palembang (*Knappert*); Soekaranda (*Dohrn.*) Insel Nias, Gun.-Sitoli, April, 1886 (*Modigliani*). Insel Engano, Bua Bua, Mai bis Juni, 1891 (*Modigliani*);

Kisa-juc, Mai, 1891 (*Modigliani*). Insel Simalur, Pulu Babi, April, 1913 (*Jacobson*). Java, Palabuan Ratu (*Axel Preyer*); Tengger Gebirge, 4,000 Fuss (*Fruhstorfer*); Soekaboemi 2,000 Fuss (*Fruhstorfer*); Buitenzorg, 24ten Februar bis 12ten März, 1904 (*Kraepelin*); Depok (*Nierstrass*). Borneo, Insel Banguey (*Kedenburg*); Sarawak (*Doria*); R. Limbang, 4ten April, 1910 (*Moulton*); Kinabalu (*Waterstradt*); Tandjong (*Suck.*), Sandakan (*Baker*). Philippinen, Insel Luzon, Los Baños (*Baker*); Mount Maquiling (*Baker*). Insel Mindanao, Butuan (*Baker*); Dapitan (*Baker*); Iligan (*Baker*); Kolambugan (*Baker*). Insel Leyte, Tacloban (*Baker*). Insel Palawan, Puerto Princesa (*Baker*). Celebes, Toli Toli, November bis Dezember, 1895 (*Fruhstorfer*). Halmahera (ex. coll. Westermann).

UNTERART SUBOCELLATA CASTELNAU UND BRULLÉ

Sumatra, Tebing-tinggi, 11ten Oktober, 1884 (*Schultheiss*). Borneo, Sandakan (*Baker*). Java, Preanger (*Sijthoff*) meist ohne genaueren Fundort; Pengalengan, 4,000 Fuss (*Fruhstorfer*). Philippinen, Insel Mindanao, Iligan, Butuan (*Baker*); Dapitan (*Baker*); Kolambugan (*Baker*).

**Ceropria induta var. purpurina var. nov.**

Diese Form ist eine Abänderung der typischen *induta*, also schmal, mit leicht gefurchten Decken, schwach oder undeutlich punktierten Zwischenräumen, sie unterscheidet sich von *induta* durch die Färbung; die Seiten des Halsschildes sind lebhaft goldig, die Flügeldecken purpurviolett mit kleinem, blaugrünen Schulter- und Apikalfleck, seltener ist die Naht und eine Querbinde zwischen den Flecken goldig. Diese Abänderung vertritt die eigentliche *induta* in Vorderindien. Ich fand sie in den Sammlungen unter den Namen *C. speciosa* Kl., *nepalensis* Sturm, und *hoppei* Gory.

Mir liegen circa 60 Exemplare vor in den Sammlungen Berlin, Dahlem, München, Gebien, und Schuster.

Südindien, Madura, Shembaganur, Kanara (*Andrewes*); Himalaya, Kulu (*Rost.*); Darjeeling; Nepal; Ramnagar, U.P., 11ten Dezember, 1912, unter Rinde von *Salix*. Nordost Assam, Sadiya, 26ten November, 1911 (Abor Expedition, Kemp). Assam, Khasia Hills.

**Ceropria opulenta** Harold. Tafel 1, Fig. 7.

*Ceropria opulenta* HAROLD, Stett. Ent. Zeitg. 38 (1877) 354.

Harold beschränkt sich bei der Beschreibung dieser und verwandter Arten auf die genaue Angabe der Farbe. Es sind

daher einige plastische Merkmale hinzuzufügen, zumal dem Verfasser nur ein Weibchen vorlag. Ich besitze jetzt beide Geschlechter.

Die Stirn hat keinen Eindruck, sie ist beim Weibchen reichlich halb so breit wie ein Auge von oben gesehen, beim Männchen viel schmäler, das Epistom ist in diesem Geschlecht viel breiter als die Stirn vorn zwischen den Augen, beim Weibchen ebenso breit. Die Fühler sind vom vierten Gliede an gesägt, beim Männchen sind die Glieder kaum quer, beim Weibchen dagegen wesentlich breiter als lang. Der Halsschild ist beim Männchen doppelt so breit wie lang, beim Weibchen breiter. Die Färbung der Decken ist sehr lebhaft, bei den Männchen ist der Grund mehr goldig, im vierten Streifen stehen ungefähr 60 Punkte. Das Prosternum ist vorn leicht gekielt und liegt eckig über dem Hals, der Fortsatz ist nicht gerandet, die Ecken der Mittelbrust sind ziemlich scharf. Das Abdomen ist fein längsstrigos und sehr fein punktiert. Die Vorderschenkel des Männchens sind sehr kurz goldgelb beborstet, die Vorderschienen sind leicht geknickt, in der Endhälfte verbreitert, und dort innen mit vier oder fünf Körnchen versehen. Die Mittelschienen sind ebenfalls leicht geknickt, gegen das Ende schwach verbreitert und undeutlich gekörnt. Die Hinterschienen sind ziemlich dünn, beim Männchen aussen am Ende nicht mit Eindruck versehen. Die Vordertarsen sind kräftig verbreitert.

Länge, Männchen, 10.5 Millimeter; Weibchen, 9.6.

Ein Weibchen von Sumatra (Type im Berliner Museum); 1 Männchen von Medan (Type Männchen) in meiner Sammlung; ein Männchen von Sumatra. Soekaranda (*Dohrn*), im Stettiner Museum.

**Ceropria caesarea** sp. nov.

Sehr gross, lang oval, stark gewölbt, von der Gestalt der grossen *Eucyrtus*-Arten. Kopf, Unterseite, und Beine schwarz. Halsschild purpurviolett mit goldenen Makeln und Binden. Flügeldecken ohne Flecke und Binden, dunkel goldig braunbronzefarben, die Punktstreifen selbst schmal purpur-bläulich, Epipleuren herrlich stahlblau.

Der Kopf ist klein, die Stirn breit und kräftig längsgefurcht, die Augen sind stark quer, die Stirn vorn zwischen ihnen weniger als halb so breit wie ein Auge, kaum breiter als das dritte Fühlerglied lang, viel schmäler als das Epistom vor den Augen, die Augenfurche ist nur unter starker Vergrösserung sichtbar.

Die Punktierung ist sehr fein; die Wangen sind geradlinig und stark verengt, die Ecken des Epistoms liegen daher weiter nach innen als die Mitte der Augen hinter ihnen. Die Fühler sind stark gesägt, Glied 4 länger als 3, schon etwas quer, die folgenden sind nach innen spitz dreieckig ausgezogen, viel breiter als lang, sehr stark flach gedrückt. Das letzte Glied ist auffällig klein, etwas quer.

Der Halsschild ist auch an den Seiten gewölbt, nicht ganz doppelt so breit wie lang, die basalen Eindrücke sind rundlich, stark, dort ist die Punktierung dichter und gröber als auf der Scheibe, an den Seiten und vorn aber fast erloschen. Die Spitze erscheint fast gerade abgestutzt. Die Färbung ist charakteristisch und erinnert etwas an die von *festiva* und *versicolor*, ist aber viel schöner. Auf herrlich violettem Grunde findet sich in der Mittellinie der Vorderhälfte eine längliche Goldmakel, am Rand jederseits eine O-förmige, und hinter der Mitte eine quere, die an den Seiten mit den Randmakeln zusammenhängt und den violetten Basalrand abtrennt. Wo die violette Grundfarbe in die goldige übergeht, sind die Ränder schmal kupferrot.

Die Flügeldecken haben sehr starke Schulterbeulen, die vorn den sechsten Streif an den fünften herandrängt. Die quere Wölbung ist besonders hinten sehr stark, so dass hinter der Mitte der Seitenrand gerade noch sichtbar ist, am Rande findet sich jederseits vor der Mitte ein kräftiger Eindruck. Die Zwischenräume sind volkommen flach und zeigen nur bei sehr starker Vergrösserung sichtbare Punktierung. Die Punkte der Reihen stehen äusserst dicht (weit über 100 im vierten Streif), sind aber nicht vertieft. Die Spitze der Decken ist beim Weibchen in einen ganz kurzen Schwanz ausgezogen, dieser ist stark zusammengedrückt, so dass die Naht unmittelbar an der Spitze klafft und sich am Fortsatzende wieder zusammenschliesst.

Das Prosternum ist vorn gekielt, fällt nach vorn gerade ab, und ist zwischen den Hüften jederseits fein gefurcht; die Propleuren sind glatt, die Mittelbrust ist V-förmig ausgeschnitten, die Hinterbrust ist der Länge nach fein und stumpf gekielt, das Abdomen des Weibchens zeigt am dritten und vierten Segment eine auffällig breite Gelenkhaut und dürfte beim Männchen wie bei *versicolor* gebildet sein. Das Analsegment ist beim Weibchen nicht ausgezeichnet.

Länge, 14 Millimeter; Breite, 7.2.

Ein Weibchen von Malacca, in meiner Sammlung.

Die grösste und eine der schönsten Arten der Gattung, sie dürfte zur Gruppe *versicolor* gehören, doch kann das nur nach

Bekanntwerden des Männchens entschieden werden; sie unterscheidet sich aber durch sehr stark gesägte Fühler. Die Färbung des Halsschildes, die starken Schulterbeulen, die gekielte Hinterbrust, und die sonderbare Bildung der Flügeldeckenspitze sind in der Gattung ohne Seitenstück.

**Ceropria dolorosa** Fairmaire.

*Ceropria dolorosa* FAIRMAIRE, Notes Leyd. Mus. 5 (1883) 34.

Diese Art ist mir unbekannt geblieben. Sie ist von Saleyer beschrieben. Ich glaubte zuerst, die *C. tristis* Harold von dem benachbarten Timor auf die Art beziehen zu müssen. Aber *tristis* ist wesentlich grösser (10 bis 11 Millimeter, statt 8), glänzend schwarz, Fairmaire's Art schwarzbraun und die Flügeldecken haben flachere Interstitien als *induta*, während sie bei *tristis* tiefer gefurcht sind. Ich muss mich, da ich keines der mir vorliegenden Tiere auf *dolorosa* deuten kann, auf eine Wiedergabe der Beschreibung beschränken.

Oblongo-ovata, modice convexa, nitida, fusco-nigra, vix sensim metallescens, subtus fere opaca, tarsis antennisque obscure, piceis; capite interoculos subtiliter sat dense punctato, ante oculos utrinque sat profunde foveolato, inter antennas sulcato; antennis brevibus, art. 4–10 aequalibus, triangularibus, punctatis, 10° obtuse rotundato, prothorace elytris paulo angustiore, longitudine duplo latiore, lateribus marginalis, antice cum angulis rotundatis, margine postico utrinque late sinuato, medio recto, dorso subtilissime sat dense punctulato, basi utrinque impressione brevi, oblonga, interdum oblique signato; scutello late ogivali laevi; elytris tenuiter striatis, striis subtiliter punctatis, intervallis vix convexiusculis, obsoletissime punctulatis, subtus laevis, prosterno apice fere recte angulato, planato, utrinque tenuiter striato.

Ressemble un peu a la *C. induta* Wiedem. mais bien différente par la coloration sombre, la taille plus petit, les élytres plus courtes, à stries plus fines, plus finement ponctué avec les intervalles plus plans.

**Ceropria tristis** Harold.

*Ceropria tristis* HAROLD, Stett. Ent. Zeitg. 38 (1877) 349.

Mir liegt ausser den Typen dieser Art aus dem Berliner Museum kein weiteres Material vor. *Ceropria tristis* ist der *induta* nahe verwandt, aber etwas grösser und schmäler, glänzend schwarz und an dieser Färbung leicht zu erkennen. Die Clypealfurche ist tiefer eingeschnitten, die Vorderwinkel des Halsschildes sind breiter verrundet, Vorder- und Mittelschienen stärker geknickt, die letzteren haben in der Mitte einen viertelkreisförmigen Ausschnitt, der bei *induta* viel schwächer ist.

Im übrigen ist auf Harold's Beschreibung zu verweisen. Leider durfte ich an dem Material die Männlichen Geschlechtswerkzeuge nicht untersuchen.

Timor.

**Ceropria subnigra** sp. nov.

Von der Gestalt and Grösse der *induta*, glänzend schwarz mit schwachem, bläulichem Schimmer. Fühler und Beine schwarz.

Der Kopf hat hinten auf der Stirn ein punktförmiges Grübchen, er ist sehr fein punktiert. Die Stirn ist vorn zwischen den Augen so breit wie Glied 3 und 4 der Fühler lang, die Querfurche ist kräftig und schmal eingedrückt, gebogen. Die Fühler sind vom vierten Gliede an gesägt, die einzelnen Glieder aber nicht sehr scharf dreieckig, kaum quer.

Der Halsschild hat ganz die Gestalt wie der von *induta*, ist also sehr flach und gleichmässig gewölbt, einfarbig schwarz, die Vorderecken ragen aber fast garnicht mehr vor, sind breit verrundet, die Hinterecken sind scharfwinklig, fast 90° gross, die Basis ist ungerandet. Die Punktierung ist äusserst fein, die Seitenrandkehle ist nicht breiter als bei *induta*.

Die Flügeldecken sind gefurcht, die Zwischenräume besonders hinten gewölbt, aber kaum wahrnehmbar punktiert. Die Punkte der Streifen sind sehr klein und eng, bis auf die fast glatten Zwischenräume ist kein Unterschied zwischen beiden Arten vorhanden.

Das Prosternum ist vorn leicht aber deutlich gekielt, die Mittelbrust ist, von der Seite gesehen, ganz verrundet, das Abdomen beim Weibchen sehr fein, anliegend, sparsam behaart, in beiden Geschlechtern ohne weitere Auszeichnung. Die Vorderschienen des Männchens sind schmal, deutlich, wenn auch schwächer als bei *induta*, geknickt, am sehr schwach erweiterten Ende mit zwei oder drei Körnchen versehen. Die Mittelschienen sind beim Männchen nur sehr schwach gebogen, ohne Ausschnitt, und auf der Vorderseite der ganz schwachen Verbreiterung undeutlich tuberkuliert. Vordertarsen schwach verbreitert.

Länge, 10 bis 10.8 Millimeter.

Ein Männchen von Amboina im Museum München; 1 Männchen eben daher (*Felder* leg.) im Museum Berlin; 1 Weibchen von Buru in meiner Sammlung; 2 weitere, stark defekte Tiere, von denen sich nicht einmal das Geschlecht feststellen liess, ohne Fundort, im Münchener Museum.

Diese, der *C. induta* verwandte Art, unterscheidet sich von ihr nicht nur durch die Färbung, sondern besonders auch durch die etwas andere Beinbildung des Männchens und das Grübchen auf der Stirn. Die Mittelschienen sind fast gerade. Von der vorigen Art, die tiefschwarz ist, unterscheidet sie die etwas geringere Grösse, die schwächer gefurchten Decken mit deutlicher punktierten Zwischenräumen, das Grübchen auf der Stirn die wesentlich breiter als bei *tristis* ist, und die fast einfachen Mittelschienen des Männchens. *Ceropria dolorosa* muss ebenfalls ähnlich sein, ist aber braunschwarz, auch sonst zeigt die Beschreibung Abweichungen, ferner ist die Art nur 8 Millimeter gross.

**Ceropria mindorensis sp. nov.**

Von der Gestalt der *induta*, mattbraun, Vorderkörper zuweilen leicht glänzend, Flügeldecken manchmal mit der Spur von Metallschimmer, Tarsen, Kniee, Fühler, und Mundteile rotbraun, die Wurzel der einzelnen Fühlerglieder dunkler.

Der Kopf ist auf der Stirn ganz leicht eingedrückt, dort etwas gröber, aber doch sehr fein und eng punktiert, die Wangen sind nicht viel schmäler als die Augen. Die Stirn ist vorn recht breit, so breit wie ein Auge im Querdurchmesser und ebenso breit wie das Epistom vor ihr; die Quernaht ist leicht angedeutet. Die Fühler sind wesentlich länger als das Pronotum, die vorletzten Glieder sind auffällig lang gestreckt, die Glieder sind dreieckig, kaum quer, der Stiel ist dunkel.

Das Pronotum ist dem von *induta* gleich, doch ganz ohne Metallschimmer, die Punktierung kaum etwas dichter und deutlicher.

Die Flügeldecken sind flach, schmal, ihr Seitenrand ist von oben vollständig sichtbar. Die Punkte der Streifen stehen sehr dicht, die Zwischenräume sind fast flach, erscheinen aber bei Ansicht schräg von hinten ganz leicht und unauffällig dachförmig. Sie sind äusserst fein punktiert. Die Spitzen sind einfach. Unterseite und Beine sind kaum nennenswert anders als bei *induta*.

Länge, 9.2 bis 10 Millimeter; Breite, 4.5 bis 4.8.

Philippinen, Mindoro.

In beträchtlicher Zahl in meiner Sammlung und bei Staudinger und Bang-Haas, von dem ich die Art erwarb und dem ich sie als *dolorosa* bestimmte, unter welchem sie vermutlich in die Sammlungen verbreitet wurde. Ich selbst hielt sie zuerst

dafür.[1] Nach genauerer Durchsicht des gesamten mir vorliegenden Materiales glaube ich jedoch dass die auch geographisch weit getrennte Art von Saleyer nicht zu unserer Art gehört; *dolorosa* soll schwarz braun, glänzend sein, während unsere Art matt ist; auch sind dort die Zwischenräume ganz flach, deutlich punktiert, bei *mindorense* dagegen schwach gekielt, fast unpunktiert, überdies ist letztere kleiner, 8 Millimeter statt 9 bis 10.

**Ceropria bifasciata** Chevrolat.

*Ceropria bifasciata* CHEVROLAT, Compt. Rend. Soc. Ent. Belg. 21 (1878) CL; FAIRMAIRE, Ann. Soc. Ent. Belg. 40 (1896) 26.

Sehr schmal, flach, dunkelblau, ohne Metallglanz, Decken mit zwei roten Querbinden, Hinterbrust und Abdomen rotbraun.

Die Stirn ist in beiden Geschlechtern in der Längsrichtung leicht gewölbt und hat einen sehr seichten, mittleren Längseindruck, sie ist vorn kaum breiter als ein Auge im Querdurchmesser, aber deutlich breiter als das Epistom vor den Augen. Vor jedem Auge befindet sich ein kräftiger Eindruck, die Punktierung ist fein, aber sehr deutlich, besonders in der Längsfurche. Die Fühler überragen mit den letzten Gliedern die Basis des Pronotums und sind beim Weibchen etwas kürzer, die Glieder sind vom sechsten an scharf dreieckig, die vorhergehenden schwächer nach innen erweitert, die Glieder sind so lang wie breit, das letzte ist oval, Glied 3 ist kaum länger als 4, aber stark gestreckt.

Der Halsschild ist an der Basis reichlich doppelt so breit wie in der Mittellinie lang, kräftig gewölbt, die Basalgrübchen sind sehr deutlich, aber nicht tief, die hinteren ⅔ des Pronotums sind parallelseitig, die Hinterecken scharf rechtwinklig, die Spitze erscheint von oben gesehen fast gerade abgeschnitten, die breit verrundeten Vorderecken ragen kaum vor, die Punktierung ist sehr fein und ziemlich dicht.

Die Flügeldecken sind lang gestreckt, oben flach, aber mit fast senkrecht abfallenden Seiten. Es gehen zwei Binden über die Decken; die vordere vor der Mitte ist so breit oder sehr wenig schmäler als der dunkle Raum an der Basis vor ihr, sie lässt den Randstreifen frei, geht aber über die Naht hinaus, sich dort nach hinten ziemlich spitz verbreiternd, sie sendet im vierten Zwischenraum einen kleinen, rundlichen Ast nach

[1] Philip. Journ. Sci. § D 8 (1913) 385.

vorn. Die hintere Binde lässt den Nahtstreif und die beiden äusseren Streifen frei, sie ist schwach länglich und von der Naht etwas schräg nach aussen und hinten gerichtet. Die Punktreihen sind kaum vertieft, die Punkte kräftig und nicht sehr dicht, im vierten Streif stehen etwa 40 Punkte. Die Zwischenräume sind auf der Scheibe flach, sehr fein, aber deutlich und dicht punktiert, die äusseren hängen ganz leicht nach aussen über, sie erscheinen daher aussen, in der Nachbarschaft des jeweiligen nächsten Streifens etwas rippenförmig. Die Spitzen sind gemeinsam verrundet, von der Seite gesehen bei beiden Geschlechtern nicht heruntergezogen.

Das Prosternum ist vorn nicht gekielt, der Fortsatz ist schmal, wagerecht, querüber stark gewölbt, die Ecken des Mesosternums sind ganz verrundet, die Pleuren und die Episternen der Hinterbrust sind unpunktiert, das Abdomen ist fein punktiert, beim Männchen normal. Die Schenkel sind dick, fast gekeult, die mittleren deutlich gekrümmt, alle kräftig und wenig eng punktiert. Die Vorderschienen sind beim Männchen leicht gekrümmt, aussen der Länge nach fein gekielt, die Mittelschienen sind stark gekrümmt, fast geknickt, in der Endhälfte verbreitert, kaum tuberkuliert, die hinteren gerade, die beiden letzten Paare ungekielt. Die Vordertarsen des Männchens sind leicht erweitert, die Behaarung der Sohlen der Hintertarsen ist zweizeilig.

Länge, 8.5 bis 9.2 Millimeter; Breite, 4 bis 4.2.

Zwei Pärchen in meiner Sammlung; 1 Männchen im Museum Dahlem.

India Oriental, Kanara, Madura, Shembaganur.

Mit dieser Art beginnt eine kleine Reihe von Arten mit roten Querbinden auf den Flügeldecken. Von den andern so gezeichneten Arten ist diese sofort an den blauen Flügeldecken zu erkennen, auf denen die vordere Binde über beide Decken herübergeht, also nicht durch die Naht unterbrochen ist.

**Ceropria serripes sp. nov.**

Schmal oval, flach, Unterseite und Beine rotbraun, Halsschild schwarzbraun, Flügeldecken fast schwärzlich mit schwachem, bläulichen Schein, Zeichnungen auf ihnen gelb.

Der Kopf ist in der Längsrichtung fast flach, die Clypealsutur daher kaum eingedrückt, die Stirn ist vorn zwischen den Augen wesentlich breiter als das dritte Fuhlerglied lang, aber etwas schmäler als ein Auge von oben gesehen, auf der Stirn befindet sich eine kräftige, rundliche Grube. Das Epistom ist so lang

wie der Raum zwischen den Augen, vor diesen kräftig eingedrückt. Die Punktierung ist sehr fein; die Fühler sind mässig lang, Glied 3 ist über doppelt so lang wie an der Spitze dick, 4 und 5 sind etwas rundlich, die folgenden mehr dreieckig, so breit wie lang.

Der Halsschild ist nicht ganz doppelt so breit wie in der Mittellinie lang, in der Endhälfte parallelseitig, die basalen Eindrücke sind sehr tief, ausserdem finden sich nach innen davor zwei weitere schwächere Eindrücke, die aber vielleicht individuell sind. Der Vorderrand ist, von oben gesehen, fast gerade abgestutzt, die Punktierung ist sehr deutlich, aber fein, wenig eng, regelmässig.

Die schmalen Flügeldecken sind oben depress, in der Mitte auf längere Strecke fast parallelseitig. Die Zeichnung ist charakteristisch: es findet sich eine vordere, gelbe Binde, die weit nach vorn gerückt ist, so dass der Raum vor ihr schmäler ist als sie, sie erreicht den Seitenrand, lässt aber die Naht frei, im fünften Zwischenraun sendet sie einen Ast nach vorn bis zur Basis, der einen kleinen schwarzen Humeralfleck und eine quere, gemeinsame Skutellarbinde absondert, der Hinterrand der gelben Binde ist leicht gezackt. Vor der Spitze befindet sich ein länglicher, beiden Decken gemeinsamer Fleck, der auf dem ersten und zweiten Streif entlang läuft. Die Zwischenräume sind innen ziemlich flach, nach hinten und aussen aber stark gewölbt, die Wölbung hängt nach aussen nicht deutlich über, die Punktierung ist sehr fein, die Spitzen sind gemeinsam verrundet. Die in den Streifen stehenden Punkte sind mässig dicht, im vierten stehen circa 40 Punkte.

Die Unterseite ist rot, das Prosternum wagerecht, schmal, ungefurcht, vorn nicht gekielt, Pro- und Epipleuren sind glatt, die Episternen der Hinterbrust sind deutlich punktiert. Die Punkte des Abdomens sind ziemlich weitläufig, aber ungewöhnlich stark, männliche Auszeichnungen fehlen. Die Schenkel sind kräftig, die mittleren und hinteren auf der Unterkante deutlich gekrümmt. Die Vorderschienen des Männchens sind gerade, die mittleren dünn, gerade, nur mit nach innen kräftig gekrümmter Spitze und auf der Innenseite mit circa vier scharfen Zähnen versehen. Die Hinterschienen sind leicht gekrümmt und gegen das Ende schwach verdickt. Die Vordertarsen sind im männlichen Geschlecht nur schwach verbreitert, die hinteren sehr zart, unten 2-zeilig behaart.

Länge, 7.8 Millimeter; Breite, 3.3.

Ein Männchen von Tenasserim. Plapoo, April, 1887 (*Fea*) im Museum Dahlem.

Eine ausgezeichnete Art; an der Zeichnung der Decken und den scharf gesägten Mittelschienen der Männchen leicht kenntlich. Von der vorigen Art durch diese Merkmale, die schwarze Oberseite mit dunkelbraunen Halsschild, und die gefurchten Decken gut geschieden. Vielleicht ist die folgende Art das Weibchen von *serripes*.

**Ceropria vidua sp. nov.**

Die Beschreibung der vorigen Art passt auf unsere, so dass es nur einiger Ergänzungen bedarf. Die Fühlerglieder sind stark quer, fast doppelt so breit wie lang; statt der runden, kräftigen Grube auf der Stirn findet sich nur ein sehr undeutlicher Längseindruck, die ersten Zwischenräume sind auch hinten ganz flach, sie sind fein, aber sehr deutlich punktiert, die Punktierung ist bei 10-facher Vergrösserung gut zu sehen, bei der vorigen Art nicht. Der hintere Fleck ist ebenfalls beiden Decken gemeinsam, aber quer und schräg von vorn nach der Naht hinlaufend, die Naht selbst läuft also tief in den Fleck hinein.

Länge, 7.5 Millimeter; Breite, 3.6.

Ein Weibchen von der Arraianküste, in meiner Sammlung.

Die nachfolgenden als Ceroprien beschriebenen Arten sind mir unbekannt geblieben. Ich konnte sie daher nur zum Teil in der Tabelle unterbringen. Eine Zusammenstellung der Beschreibungen dürfte aber wünschenswert sein.

**Ceropria rufofasciata Fairmaire.**

*Ceropria rufofasciata* FAIRMAIRE, Notes Leyd. Mus. 15 (1893) 22.

Long. 10 mm.—Ovato, modice convexa, nigrofusca, nitida, elytris utrinque fasciis 2 rufis ornatis, suturam haud attingentibus, 1ª ante medium transversa, valde dentata, 2ª fere apicali, paulo obliqua; capite subtiliter punctulato, inter oculos impresso, antice transversim sulcatulo et utrinque impresso, oculis valde transversis, antice approximatis, antennis elongatis, fuscis, opacis, apicem versus paulo latioribus, articulis 6–10 fere triangularibus, 9° et 10° latioribus et brevioribus; prothorace elytris haud angustiore, longitudine duplo latiore, antice angustato, lateribus sat rotundatis, dorso subtiliter sat dense punctato, basi biimpresso et medio rotundatim paulo lobato; scutello valde obtuso; elytris ovatis, basi truncatis, subtiliter substriato-punctatis, intervallis planis, subtilissime sat dense punctulatis; subtus cum pedibus fuscus, nitidus, vage aenescens, abdomine lateribus, medio obsolete striolato, prosterno apice compresso, acuto, mesosterno antice acute excavato.

Hab. Borneo (S. Müller).—Un seul exemplaire du Museè de Leide.

Ressemble beaucoup à la *Ceropria bifasciata* Chevr., de Bombay, mais cette dernière est bien plus oblongue, plus parallèle, avec le corselet moins

court, moins impressionné à la base, les élytres bien plus fortement striées-ponctuées, a intervalles moins plans, à bande antérieure, transversant les élytres, à peine dentée, et les antennes plus courtes, à articles 4–10 transversaux.

### Ceropria bifoveata Fairmaire.

*Ceropria bifoveata* FAIRMAIRE, Notes Leyd. Mus. 15 (1893) 21.

Long. 12 mill.—Ovato-elliptica, parum convexa, valde nitida, viridi-aeneo-coerulescens, prothorace maculatum purpureo-micante, elytris aeneo-coerulescenti et purpureo fere tesselatis; capite sat brevi, fere indistincte punctulato, oculis antice valde approximatis, extus fere angulatim convexis, antennis fuscis, opacis, dense punctatis, valde serratis, basin prothoracis superantibus, articulo 2° brevi, 3° angusto, ceteris sat late triangularibus; prothorace elytrorum basi vix angustiore, longitudine duplo latiore, antice rotundatim angustato, dorso subtiliter dense punctulato, basi utrinque foveato, margine postico utrinque late sinuato, angulis posticis rectis: scutello triangulari, impressiusculo, elytris sat amplis, ovatis, striatis, striis dense sat subtiliter punctatis, apice paulo profundioribus, intervallis vix convexiusculis; subtus fusca, vage coerulescens, sat nitida, laevis, abdomine subtilissime striolato, tibiis anterioribus leviter arcuatis et tarsis articulis 4 primis sat dilatatis.

Hab. Borneo (Schwaner).—Un seul exemplaire du Museè de Leide.

Ressemble à la *C. induta*, mais plus grande, plus ample, avec les couleurs plus disposées en damier, les yeux plus saillants, le corselet ayant à la base 2 fossettes bien marquées, les stries des élytres plus finement ponctuées et les tibias antérieurs lègérement arqués.

### Ceropria posticalis Motschulsky.

*Ceropria posticalis* MOTSCHULSKY, Bull. Soc. Imp. Nat. Mosc. 46 (1873) 476.

Statura omni praecedenti [das ist *C. femorata* Motschulsky=*erythrocnema* Castelnau und Brullé] sed color supra castaneo piceus, pedibus posticis abdomineque rufo-testaceis; thorace transverso, subtilissime punctulatis, basi bisinuato, utrinque profunde impresso, angulis posticis pectis; elytris punctato-striatis, interstitiis vix punctulatis. L. 4½ lat. 2 l.—Java.

Diese Art ist wahrscheinlich eine unausgefärbte *erythrocnema* oder *versicolor*.

### Ceropria insignis Chevrolat.

*Ceropria insignis* CHEVROLAT, Compt. Rend. Soc. Ent. Belg. 21 (1878) CLI.

Elongato-oblonga, prothorace granuloso, foveis 2 angustis, oblique impressis; elytris confertim punctulato-striatis, macula humerali lata, quartaque parte apicali laete viridibus, infra maculam et limbo parte apicali violaceo-igneis, medio et lineola secundum scutellum aureo-splendidis; capite ante oculos profunde excavato et costato; antennis nigris; epipleurae aureo-flavidis; corpore infra pedibusque (punctatis) aeneo-pallidis.—Ins. Moluccarum (Batchian). Lethierry mirsa.

Der gekörnte Prothorax ist ein sonst in der Gattung nicht vorkommender Charakter. Hier liegt, wie so oft bei Chevrolat, ein Beobachtungsfehler vor.

Nach Blair [6] ist diese Art = *C. intermedia* Harold. Der letztere Name ist der prioritätsberechtigte.

**Ceropria (?) yris** Chevrolat.

*Ceropria (?) yris* CHEVROLAT, Compt. Rend. Soc. Ent. Belg. 21 (1878) CLI.

L. 7, lat. 3½ mm. Elongata, postice ampliata, minute et obsolete punctulata, viridi-aenea: elytris striatis, singulo lineis quatuor laete viridi (suturali), marginali 2 humeralibus, lineis quinque rubro-igneis, interstitiis punctulatis; capite punctato, inter oculos sulcato, antennis nigris, ad apicem crassiusculis (6 penultimis), oculis lateralibus rotundatis, magnis reticulatis, prothorace confertim punctulato, marginato et sulcato, supra scutellum recte truncato, scutellum declivi, cordiformi; corpore infra pedibusque confertim punctulatis, aureo-cupreis; femoribus annulo apicali aureo.—Ins. Moluccarum. Lethierry data.

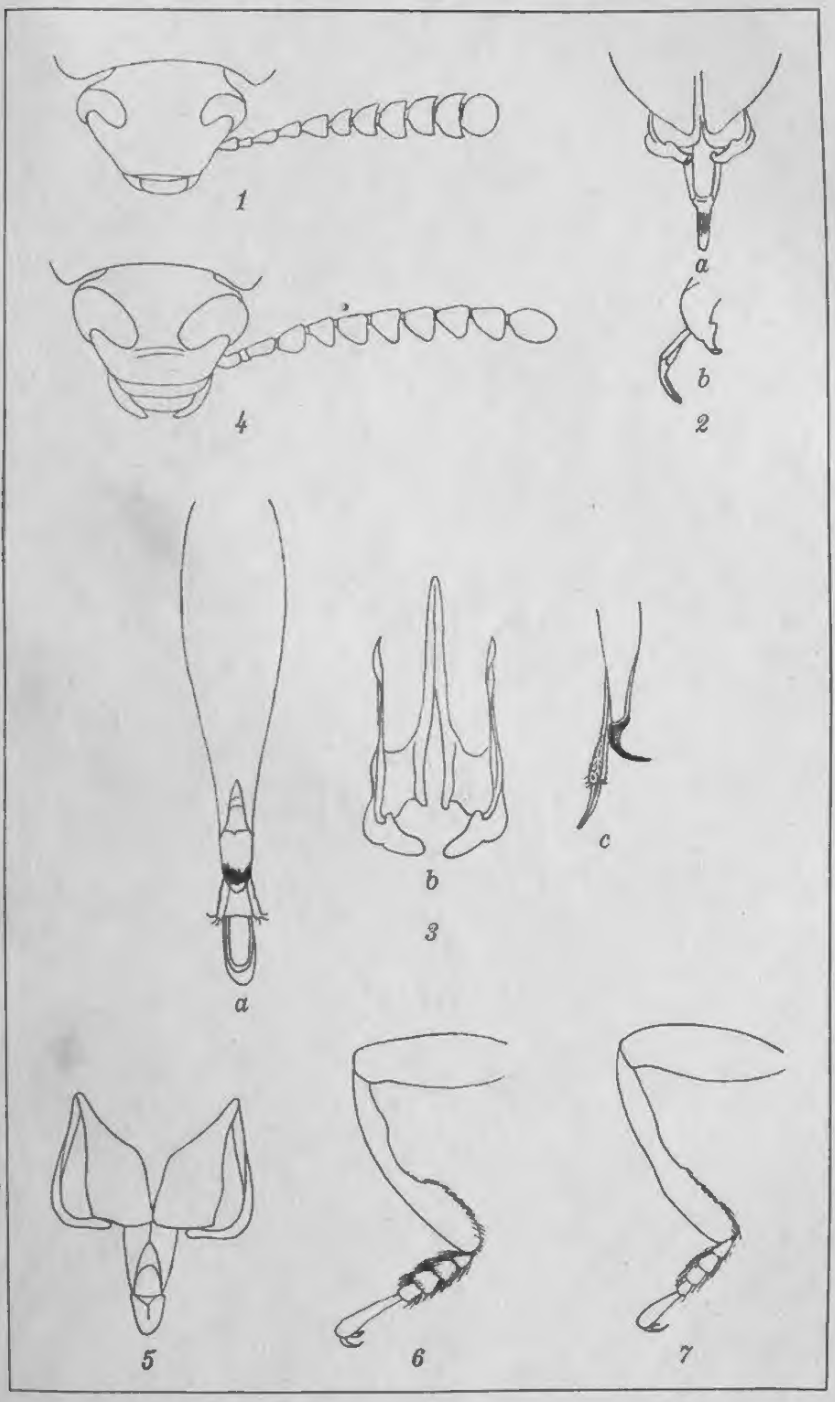
Cet insecte par les articles de ses antennes èpassis et arrondi vers l'extremite, et sa forme èlargie en arrière, devia rentrer dans un nouveau genre propre à cette famille.

[6] Trans. Zool. Soc. London 20[16] (1915) 535.

# ILLUSTRATION

## Tafel 1

Fig. 1. *Ceropria superba* Wiedemann; Kopf.
2. *Ceropria superba* Wiedemann. Männchen; Sexualapparat; *a*, bei Ansicht von hinten; *b*, bei Ansicht von der Seite.
3. *Ceropria versicolor* Castelnau und Brullé; Geschlechtsapparat; *a*, der eigentliche Penis; *b*, die äusseren Klappen; *c*, Penisspitze.
4. *Ceropria amplipennis* sp. nov.; Kopf.
5. *Ceropria amplipennis* sp. nov.; Männchen; Geschlechtsapparat.
6. *Ceropria mindanaica* sp. nov.; Männchen; Vorderschiene.
7. *Ceropria opulenta* Harold; Männchen; Vorderbein.




TAFEL 1.